NOTES ON AUSTRALIAN DIPTERA.[1] No. xi.

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(*Communicated by Dr. I. M. Mackerras.*)

(Twenty-three Text-figures.)

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Family **Calliphoridae.**

As an inducement to the study of this family by Australian workers I offer some preliminary notes on the family characters and groupings within the family, and also present descriptions of some new Australian genera and species derived from material submitted to me for identification by the late Dr. Eustace W. Ferguson. Many of the species are of considerable economic importance, and though most of them are widely distributed and common, definite specific identifications are difficult to arrive at by the use of existing descriptions and the few keys available. Later on, should material become available to me, I may be able to present a fuller revision of the Australian species.

The first difficulty that confronts the systematist in this, as in all other taxonomic work, is the definition of the group or family. To state this may appear superfluous, but the more one widens his acquaintance with taxonomic treatises the more surely he is forced to the conclusion that many, if not most, authors possess merely an intuitive knowledge of the limits of the group they write of, or their concept when reduced to plain English is so broad, ambiguous, or so full of exceptions, that the uninitiated student is largely or completely in the dark as to what really constitutes the group. This is largely true of the status of the work on the family Calliphoridae to-day. Some workers include in it the Sarcophaginae, while others exclude that subfamily, consider it a family, and incline to break the residue up into families or subfamilies according to individual taste or opinion. Personally I prefer to consider all genera that have the second abdominal sternite overlapping sides of the tergite, no well developed convexly formed postscutellum, which possess strong hypopleural bristles in one or more vertical series below the spiracle, and have the first posterior cell of the wing conspicuously narrowed at apex as belonging to the family. This definition would include Calliphorinae, Sarcophaginae, Rhiniinae, Chrysomyiinae, Metopiinae, and some other groups which may be of equivalent or lesser rank such as are represented by *Mesembrinella*, *Bengalia*, etc., but none of which occur in Australia so far as I am aware at this time.

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[1] [Mr. Malloch has given the references to Macquart's papers on Exotic Diptera to the original published in "Mémoires de la Société des Sciences, de l'Agriculture et des Arts de Lille". As these Memoirs are not in Sydney, I have added the references to the reprint published in Paris which is in the library of the Society. For a list of dates of publication see *Cat. Library Brit. Mus.* iii, L-O, p. 1215, 1910.—Ed.]

At present I possess Australian representatives of all of the five larger groups listed above, and below I give a key for the recognition of these in the hope that it may prove useful to students of the calyptrate flies. It is to be noted, however, that this key is intended to apply to Australian forms only. Some extralimital forms, such as the genus *Compsomyia*, which does not have erect hairs on the small knob below the base of wing, will not run out to their proper places in the key.

Key to Subfamilies of Australian Calliphoridae.

1. Stem-vein of wing (radius) not setulose on posterior upper side of its basal section 2
   Stem-vein of wing with distant setulae or hairs on posterior upper side of its basal section 5
2. Lower calypter with some long fine erect hairs on a part of its disc above .... *Calliphorinae*, pt.
   Lower calypter without long erect hairs on any part of its disc above 3
3. Arista bare or very short pubescent; notopleural bristles two in number .... *Metopiinae*
   Arista with at least short hairs, the longest distinctly longer than width of arista at base 4
4. Notopleurals nearly always two in number; the outer two bristles on area between the presutural dorsocentrals and notopleurals not in a straight line, the anterior one distinctly laterad of the posterior ..... *Calliphorinae*, pt.
   Notopleurals almost invariably three or four in number; the two outer bristles on the area between presutural dorsocentrals and notopleurals either in longitudinal line, or anterior one mesiad of posterior ..... *Sarcophaginae*
5. The small rounded protuberance below base of wing frequently with erect hairs, lower calypter subtruncate at apex, concave on outer margin, haired on part of upper surface ..... *Chrysomyiinae*
   The small rounded protuberance below base of wing, and upper surface of lower calypter, bare, or without distinct hairs, the calypter rather narrowly rounded at apex, straight, or nearly so, on outer margin ..... *Rhiniinae*

In connection with the above key it appears pertinent to point out that there are some characters in the structure of the male hypopygia which may have a group significance. I do not incline to give much weight to the structure of these organs in distinguishing genera or higher groups as a general rule but in some families the general structure may sometimes be relied upon to identify the males belonging to particular genera. If a comparison is made between the hypopygium of a species of *Calliphora* and one of *Sarcophaga* it is evident at a glance that there is a very decided difference in the two pairs of claspers which are directed downward at apex. In *Sarcophaga* the outer pair are short and very much less conspicuous than the inner pair, being usually referred to as the accessory plates, while in *Calliphora* they are usually as long as the inner pair and quite as heavily chitinized. There are some other distinctions but there is so much variation in the inner portions involved in the penis and its guard in the genus *Sarcophaga* and its allies that little use can be made of these in generalizing.

Undoubtedly competent morphologists could homologize the parts of the hypopygia but the taxonomist is primarily interested in differentiations and not in homologies so occasionally the latter group uses different names for the same part of an organ which course, while probably perfectly justifiable from the point of view of one more especially interested in obtaining identifications than in arriving at homologies, leads to some confusion in terminology.

I have figured the hypopygia of some of the other genera dealt with in this paper and a comparison of these with the figures presented in some of the papers on Australian Sarcophagidae will readily show the distinction to which I refer.

One of the fatal objections to the use of the structure of the male hypopygia as an index to generic and subfamily relationships is that it is very rarely the case that co-ordinated characters can be found in the females and a classification based upon one sex is, not only a hindrance, but practically a bar to the study of any group in which it is so used unless one has authentic males and females of the species, which it is rarely possible to obtain without long and arduous field work.

Subfamily Calliphorinae.

In this subfamily there are in use several generic names which have rather a doubtful status, the basis for the separations being the different number of the so-called sublateral bristles present. These consist of from one to three bristles in front of the thoracic suture in line with the postsutural intra-alar bristles and mesiad of the two presutural bristles referred to in the foregoing key to genera, the latter being known as the posthumeral (anterior) and presutural (posterior) bristles respectively. The genus *Cynomyia*, which I have not seen from Australia, has but one of these sublateral bristles, which is almost in line transversely with the hind margin of the humeral callosity, both the weak anterior one and the one just in front of suture being absent. In the genus *Steringomyia*, also unknown to me from Australia, there are two of these bristles present, while in *Onesia* and *Calliphora* all three are usually present.

If we apply these characters to the Australian species included in *Calliphora* by Patton and by Hardy in their recent papers it becomes evident that there are either two or more genera present, or the character is not of generic value. *Cynomyia* I consider is a good genus, but in some Australian species of *Calliphora* the posterior one of the sublateral bristles may be entirely indistinguishable in some specimens, while it is evident though weak in others even of the same species. I am inclined to consider that under these circumstances the Australian species at least cannot be thus generically divided. I find that in *Onesia* there are from one to three sublaterals present, the usual number being three. I do not care to express an opinion here on the validity of *Steringomyia*.

The distinctions between *Onesia* and *Calliphora* are even less marked than are those between the latter and *Steringomyia*. The most recent attempt to separate these is that by Shannon in 1923 in dealing with the North American forms. He cites the straight or slightly curved apical section of fourth vein as against the distinctly curved one, and the short as against the longer third antennal segment as characters in *Onesia* and *Calliphora* respectively, but there is no reason to accept these as generic criteria, the evident intent being merely to perpetuate, and not to discard existing generic concepts. The worst feature of accepting *Onesia* as the same as *Calliphora* is that the former has page priority in the paper in which they both were published and thus would supplant *Calliphora*, with a consequent change of the name of the family to Onesiidae.

It is unfortunate that intensive research almost invariably results in more or less radical changes in names of even the most widely known and common insects, and the fault lies not with the modern worker who applies the rule of priority, but with those of past generations who failed to appreciate identities and co-ordinate related forms. Were it possible to accept *Onesia* and *Calliphora* as distinct I would not hesitate to suggest this course, but I can see no good excuse for doing so on any characters distinguishable by me.

En passant it must be remembered that we have been using the name *Calliphora* contrary to the rules of priority, as it has been proven that the name properly

applied to the group is *Musca*, and that the group now known under the generic name *Musca* should be known as *Promusca* Townsend. An attempt has been made to conserve the name *Musca* for the group containing *domestica* and its allies, and in the event that such a course is adopted then the name *Calliphora* will naturally fall as a synonym of *Onesia*. The proper medium for the final disposition of these points would be a monograph on the family so I merely state conditions, and do not make any drastic changes herein, this paper being intended merely to stimulate interest in the family it deals with.

I present below a key for the separation of the few genera of this subfamily I have seen from Australia. There are probably more native genera, but the amount of material available to me now is rather scanty, and possibly with this paper in hand some student of the calyptrate flies may be induced to take an interest in it so that more specimens from a wider range of territory may become available.

Before I attempt to deal with the genera and species of this family it may be well to give space to some remarks upon the status of some of the names in the group apart from the generic names just referred to.

Major Patton has been for some years actively engaged in publishing papers on Calliphoridae and Muscidae, particularly those forms which affect man and domestic animals, and one of his recent papers deals with Australian Calliphoridae. In this paper he cites a number of synonyms and describes several new species. All of the new species are available to me in material sent to me by Dr. Ferguson, so that it is possible to include data upon them in the present paper. It is, however, impossible for me to decide definitely whether his conclusions as to specific identities are or are not correct. I incline to the opinion that some at least of the species he includes as synonyms are perfectly valid species, but without having the same opportunity as he had to examine the type specimens it would be unwise to be dogmatic in giving determinations upon most of these. Mr. Hardy has also recently published a paper dealing with the species of *Calliphora* and though his ideas and mine appear to conform better than do Major Patton's and mine there are so many additional species in my material which he did not have that it is impossible for me to definitely decide what certain of his species are in my lot. However, it may be possible after my paper appears for the data presented to be used in bringing together material for use in a comprehensive study of all the Australian species of the family.

The most recent paper dealing with Calliphoridae is that by Mr. Senior-White. This presents a consideration of the Oriental species, but unfortunately has much the same blemishes present in Patton's work, which is to be expected because there was a close collaboration between these workers. I note here that *Calliphora fulviceps* van der Wulp, an endemic Oriental species, is omitted by Senior-White. This is a very characteristic species, with bright fulvous yellow face and cheeks, the latter furnished with long fulvous hairs, and it has but one pair of presutural acrostichals as a rule, a character which I have not seen elsewhere in the genus. I have not seen this species from other localities than the mountains of Java and Sumatra.

Key to Genera of Calliphorinae.

1. Lower calypter with some conspicuous erect fine hairs on at least part of its upper surface, sometimes very close to base only 2
   Lower calypter without any erect fine hairs on upper surface 4
2. Extreme base of stem-vein of wing on under surface with setulose hairs; upper surface of lower calypter almost entirely haired; presutural area with 3 to 5 bristles 3

Extreme base of stem-vein of wing without distinct hairs or setulae; apical part of upper surface of lower calypter broadly bare .... *Calliphora* Robineau-Desvoidy

3. Eyes hairy; no strong forwardly directed orbitals in female; the fourth tergite in this sex with a central longitudinal weak part which gives the segment the appearance of being cleft ..... *Ptilonesia* Bezzi.

Eyes bare; two strong forwardly directed orbitals on each side in female; fourth tergite in this sex entire, the apex transverse and heavily chitinized ..... *Xenocalliphora* Malloch

4. Suprasquamal ridge strongly setulose anteriorly and posteriorly ..... *Lucilia* Robineau-Desvoidy

Suprasquamal ridge bare at least anteriorly or posteriorly 5

5. Supraspiracular convexity of metathorax with long erect fine hairs ..... *Paratricyclea* Villeneuve

Supraspiracular convexity without erect fine hairs 6

6. Propleura haired in centre between the humeral hairs and those on lower margin .. 7

Propleura bare in centre 9

7. Presutural area with 4 or 5 bristles ..... *Melinda* Robineau-Desvoidy, pt.

Presutural area with two bristles 8

8. Upper half of parafacials with setulose hairs; supraspiracular ridge bare at posterior extremity ..... *Melinda* Robineau-Desvoidy, pt.

Upper half of parafacials bare; supraspiracular ridge fine haired at posterior extremity ..... *Euphumosia* Malloch

9. Thorax without yellow or golden pile or tomentum besides the usual bristles and hairs ..... *Anthracomyia*, gen. n.

Thorax with yellow or golden pile or tomentum in addition to the usual bristles and hairs ..... *Pollenia* Robineau-Desvoidy

Genus Ptilonesia Bezzi (1927).

Bull. Ent. Res., 1927, xvii, p. 242.

This genus contains one known species, with characters as indicated in the preceding key. It is most closely related to *Xenocalliphora* Malloch, an austral genus known from New Zealand. I prefer to treat this as a genus and not a subgenus as Bezzi has done. Genotype, *Pollenia auronotata* Macquart.

Ptilonesia auronotata (Macquart).

Pollenia auronotata Macq., *Mém. Soc. Sci. Lille*, 1854, p. 135 (1855); *Dipt. Exot.*, Suppl., 5, p. 115, 1855.

Similar in general habitus and colouration to *Calliphora erythrocephala*, but the bright orange coverings of the thoracic spiracles, similarly coloured scales over wing base, and the entirely different armature of the head readily distinguishes the species. The calyptrae are fuscous, with white edges.

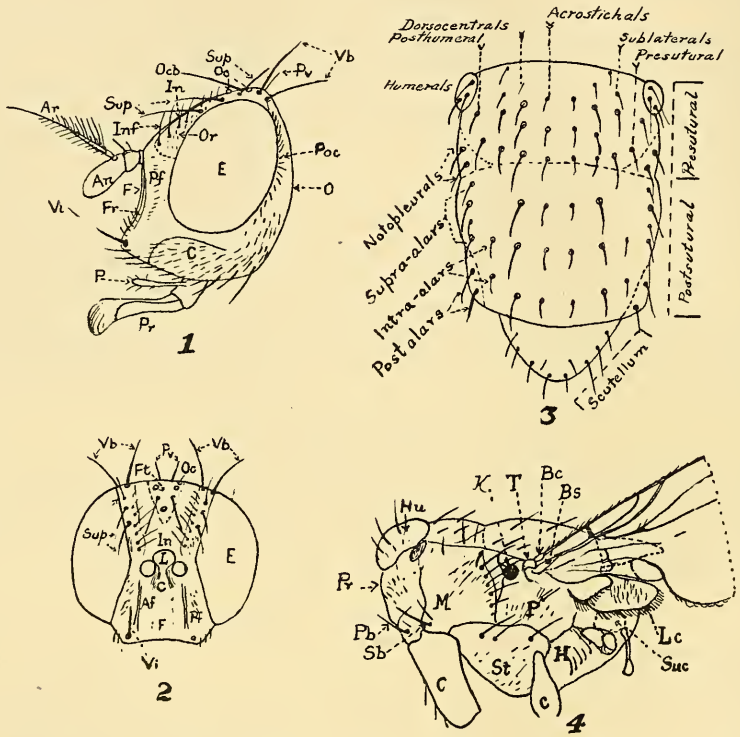
Length, 9-10 mm.

Locality: Sydney, N.S.W., one female.

Genus Calliphora Robineau-Desvoidy (1830).

The Australian members of this genus present a greater diversity of form, colour and vestiture than do those known to me from any other faunal region, and it is not surprising that certain authors have selected some of the species as types of distinct genera. In the case of genera acceptance or rejection is more a matter of individual opinion than is the acceptance or rejection of species. Almost invariably it is possible to demonstrate the existence or absence of differentiating characters in species, but in accepting or rejecting genera one has to decide whether the possession of one or more distinguishing characters in any species or group of species is sufficient grounds for considering them as entitled to generic separation from their most closely allied relatives. Some authors incline to accept a single structural character, such as the presence or

absence of hairs on the eyes, as sufficient to warrant the erection of a genus for the reception of species previously included in a genus the species of which do not possess that character, even when the whole of the species are otherwise similar in features distinguishing them from related genera. The trend of this class of work is towards the erection of a great number of monobasic genera



Text-figure 1. Head from the side, typical. An, antenna; Ar, arista; C, cheek; E, eye; F, face; Fr, facial ridge; In, interfrontalia; Inf, inferior orbital bristles; Oc, ocelli; Ocb, ocellar bristles; Or, orbit; P, palpi; Pf, parafacial; Poc, postocular cilia; Pr, proboscis; Pv, postvertical bristles; Sup, supraorbital bristles; Vb, vertical bristles; Vi, vibrissae.

Text-figure 2. Head from the front, female. Lettering as Text-figure 1, with additions, Af, antennal foveae; Ft, frontal triangle.

Text-figure 3. Dorsum of thorax, bristles lettered.

Text-figure 4. Side of thorax, no definite genus. Bc, basicosta; Bs, basal sclerite of stem vein; C, coxae; H, hypopleura; Hu, humerus; K, knob-like pleural process; Lc, lower calypter; M, mesopleura; P, pteropleura; Pb, propleural bristle; Pr, propleura; Sb, stigmatal bristle; St, sternopleura; Suc, supraspiracular convexity.

without materially assisting the student interested in classification. In other words, monobasic genera tend to obscure relationships, a result that is less desirable than is the retention in one genus of species biologically similar but separable by such a character as that mentioned above. I do not think that the genera *Neopollenia* Brauer, *Neocalliphora* Brauer and Bergenstamm, and

Paracalliphora Townsend, are entitled to full generic rank, and include them, or at least their genotypes, in my synopsis given below.

I have found it impossible to determine definitely whether or not certain forms in my possession are distinct species without a dissection of the male hypopygia and present drawings of these herein to facilitate recognition of the species involved by other students of the group. These organs are not so intricate as those of most species of *Sarcophaga*, but the interior central portions, constituting the penis and its sheath, etc., differ more or less markedly in the different species, providing characters by means of which they may be recognized. It is well known that the male hypopygia are of great value as specific criteria in many groups of insects and in the Diptera such families as Sarcophagidae, Chironomidae, Tipulidae, Dolichopodidae, Asilidae, and others are striking cases in which these organs provide reliable and outstanding means of identification in the male sex. It is not so well known, however, that some families and genera do not present great differences in the structure of the hypopygia of the males, and one need only make a study of the males of the genus *Musca sens. lat.* to discover how trivial are the structural differences between the hypopygia of even the most distinct species of the genus. In fact, Major Patton has expressed the opinion that these organs offer no means for distinguishing the species. This is not strictly correct, but the distinctions are so trivial that only one versed in the differentiation of species can appreciate them. In *Calliphora* the structure of the two apical pairs of claspers or forceps is very much the same in many of the species, but there are minor differences of form and armature, which, coupled with the differences in the structure of the central portions, readily distinguish the species I have examined.

To facilitate the use of this paper I give diagrams showing the portions of the thorax and the position of the various bristles utilized in classification (Text-figs. 1-4).

Key to the Species.

1. Eyes in both sexes with quite dense erect yellow hairs 2
   Eyes in neither sex with noticeable hairs 3
2. Thoracic dorsum densely yellowish dusted so that the ground colour is entirely or almost entirely obscured and the thorax appears entirely ochreous .... *ochracea* Schiner
   Thoracic dorsum bluish black, with whitish dusting which does not at all obscure the ground colour ..... *ochracea* form *nigrithorax* nov.
3. At least the tibiae reddish or yellowish, and distinctly paler than femora, or the femora are also yellow 4
   Legs entirely black, tibiae rarely very slightly paler than the black femora 8
4. Pleural and abdominal hairs and bristles entirely black; abdomen black, with bright golden yellow pollen which is noticeably checkered; femora, tarsi, and coxae, black, tibiae reddish, darker at bases; posterior sublateral bristle lacking ..... *tibialis* Macquart
   Pleural and abdominal hairs in part bright yellow or golden 5
5. Abdomen black or fuscous, with a metallic bronzy tinge and dense yellow dusting which is conspicuously checkered as in *tibialis*, the ventral hairs longer, and, like the lateral hairs and bristles, bright golden yellow; posterior sublateral bristle usually distinct 5A
   Abdomen honey yellow on at least the sides and venter, always with a large part of central section of disc metallic blue, or violet coloured 6

5A. Eyes of male with facets of upper half conspicuously larger than those of lower half, the frons reduced to a narrow line; thorax almost invariably with three pairs of presutural acrostichals; hypopygium as Text-figure 5 .... *stygia* (Fabricius)

Eyes of male with facets of upper half but little larger than those of lower half, the frons about as wide as third antennal segment; thorax almost invariably with two pairs of presutural acrostichals; hypopygium as Text-figure 6 .... *hilli* Patton

6. Coxae, femora, and bases of tibiae, dark brown or fuscous; thoracic dorsum when seen from behind with a narrow postsutural vitta between the acrostichals, and a spot between these and the dorsocentrals midway between suture and posterior margin, black; scutellum with the pruinosity distinctly checkered, best seen by moving the specimen round in examination; dorsum of abdomen with most of disc of basal three tergites glossy purplish or violet coloured, the dark portion not sharply limited, fourth tergite densely golden dusted, slightly checkered; posterior sublateral bristle lacking ..... *fuscofemorata*, n. sp.

Coxae, femora, and tibiae, bright honey yellow; dorsum of thorax and scutellum not marked as above 6A

6A. Thorax with two pairs of presutural acrostichal bristles, the posterior pair distinctly proximad of a transverse line drawn between the posterior pair of presutural dorsocentrals; posterior sublateral bristle lacking or almost indistinguishable from the surrounding hairs; fourth abdominal tergite densely yellow dusted, with a large underlying metallic greenish basal mark which is obscured by the dusting ..... *augur* (Fabricius)

Thorax with at least three pairs of presutural acrostichal bristles, the posterior pair just in front of suture, and much behind posterior presutural dorsocentrals; posterior sublateral bristle present, quite distinct from the surrounding hairs 7

7. Humeri bluish black, concolorous with dorsum of thorax; dorsum of abdomen broadly purple on all tergites, the dark colour of fourth conspicuous because of the presence of but thin whitish dusting; sternopleurals 1 + 1 .. *macleayi*, n. sp.

Humeri testaceous, very noticeably paler than dorsum of thorax; dorsum of abdomen partly metallic green or blue-green; fourth tergite with more conspicuous dusting; sternopleurals 2 + 1 ..... *centralis*, n. sp.

8. Posterior sublateral bristle lacking 9

Posterior sublateral bristle present, sometimes weak and short 10

9. Small species, about 5 mm. in length; abdomen bright metallic blue-green, almost entirely lacking whitish dusting on dorsum; wing veins entirely fuscous; apical section of fourth vein beyond the angle almost or quite straight ..... sp. ?

Larger species, about 10 mm. in length; abdomen brassy green, with rather dense whitish dusting which is distinctly checkered; wing veins yellow at bases, brown beyond; apical section of fourth vein beyond bend distinctly curved .... *dispar* Macquart?

10. The small unarmed scale (basicosta) between tegula and base of costal vein black or fuscous 11

The small unarmed scale between tegula and base of costal vein whitish or yellowish at least on outer half or more 14

11. Abdomen dark metallic blue, with slight even dusting and a dark central vitta on basal three visible tergites, the fourth with quite dense brassy or yellowish dust, sharply contrasting with the other tergites; calyptrae dark brown or fuscous, fringe of lower one yellowish; hairs on occiput except postocular fringe yellow, those on cheeks black ..... *apicalis*, n. sp.

Abdomen metallic blue-green or black-blue, with or almost without whitish dusting, fourth tergite not at all differentiated from the others 12

12. Robust species, with dull metallic blackish blue abdomen which is quite noticeably white dusted; scutellum with 18-20 bristles; hypopygium as Text-figure 7 ..... *robusta*, n. sp.

More slender species, with brilliant metallic blue-green abdomen which is but slightly white dusted; scutellum with 10-12 bristles 13

13. Outer forceps of male hypopygium stout (Text-figure 8); third antennal segment orange, slightly darkened at apex ..... *xanthocera*, n. sp.

Outer forceps of male hypopygium slender and tapered apically (Text-figure 9); third antennal segment fuscous, narrowly yellowish at base .. *australica*, n. sp.

14. Lower calypter fuscous, with a portion of margin as well as the thickened edge and the fringe, white; cheeks and lower portion of parafacial brownish orange, with black hairs; fourth vein beyond apical curve much bent .. *erythrocephala* Meigen

Lower calypter brownish, yellowish, or whitish, if the margin is paler than the disc the pale colour is confined to the thickened edge, and does not extend over any part of the disc; cheeks with the raised portion black or fuscous, never orange, if rufous the surface is obscured by grey dust 15

15. Males 16
Females 19

16. Facets of upper half of eye larger than usual, the frons reduced above to a very narrow line, which is not wider than anterior ocellus; dusting on entire orbits and parafacials uniformly yellowish grey and dense, when seen from the side without a dark patch opposite base of antennae and another below middle of parafacial; hypopygium as Text-figure 11 ..... *plebeia*, n. sp.
Facets of upper half of eye not especially enlarged, the frons at narrowest point at least twice as wide as anterior ocellus 17

17. Frontal orbits and parafacials densely and uniformly yellowish grey dusted, not noticeably checkered when seen from the side; apical section of fourth vein almost straight beyond angle; hypopygium as Text-figure 10 .... *minor*, n. sp.
Frontal orbits and parafacials variably dusted, with a noticeable white patch on latter just below bases of antennae which is best seen when the head is viewed from the side; if orbits are evenly dusted, the apical section of fourth vein is bent 18

18. Second visible tergite of abdomen with quite strong apical bristles on entire margin; apex of outer forceps of male hypopygium slightly but distinctly dilated or spatulate (Text-figure 13) ..... *accepta*, n. sp.
Second visible abdominal tergite without well developed bristles on hind margin centrally; apex of outer forceps of male hypopygium acute 18A

18A. Inner, or superior, hypopygial forceps of male with a deep notch basad of middle when seen from the side (Text-figure 12) ..... *clarki*, n. sp.
Inner, or superior, hypopygial forceps of male not notched when seen from the side, straight or slightly curved 18B

18B. Both pairs of hypopygial forceps of male almost straight (Text-figure 14) ..... *metallica*, n. sp.
Both pairs of hypopygial forceps of male distinctly curved (Text-figure 15) ..... *assimilis*, n. sp.

19. Abdomen bronzy black, with dense brassy or golden dust which is distinctly checkered; wings quite noticeably yellow at bases; prosternal hairs and those on centre of propleura yellow; posterior sublateral bristle strong; fourth vein distinctly curved beyond subapical angle ..... *auriventris*, n. sp.
Abdomen metallic blue, blue-green, or bronzy, with or without whitish dusting, sometimes checkered, but never with brassy or golden dust 20

20. Fourth vein beyond preapical angle very distinctly curved, not slightly and regularly arched 21
Fourth vein beyond preapical angle straight or almost so, at most with a very slight and regular arcuation on entire length 22

21. Calyptrae slightly browned, centrally at least; abdomen bright metallic greenish blue, with changeable white dusting ..... *metallica*, n. sp.
Calyptrae pure white; abdomen bronzy or greenish black, with quite dense white dusting which is distinctly checkered ..... *plebeia*, n. sp.

22. Parafacials quite densely and evenly yellowish white dusted; abdomen bluish black, with grey dust on tergites, which is rather dense, and distinctly checkered .... *minor*, n. sp.
Parafacials with checkered or variegated dusting, most conspicuous opposite second antennal segment when seen from the side; abdomen bright metallic blue-green, with rather slight whitish dusting which is most distinct laterally *accepta*, n. sp.

It must be noted that there are probably many species in Australia which are not included in the above key and that the most reliable characters for the recognition of those listed above are those of the hypopygia of the males. The females do not present many outstanding characters and it would be unwise to place too much reliance upon the diagnostic characters used for this sex without having male specimens for checking up. As already stated, the above is

presented merely as a preliminary attempt to distinguish the native species, and must be revised with the accession of more material, and the results checked by rearings in the field.

Calliphora ochracea Schiner.

Reise Novara, Dipt., p. 307, 1868; ? *Ochromyia hyalipennis* Macq., *Mém. Soc. Sci. Lille*, 1850 (*nec* 1834), p. 218; *Dipt. Exot.*, Suppl. 4, p. 245, Pl. xxii, fig. 10, 1850; ? *Adiochosia hyalipennis* Surcouf, *Nouv. Arch. Mus. Hist. Nat. Paris* (5), p. 85, 1920.

This strikingly distinct species was cited as the genotype of *Neocalliphora* by Brauer and von Bergenstamm. I cannot admit its claim to even subgeneric separation from *Calliphora*.

I am inclined to consider this, which is the mainland form, as probably entitled to specific distinction from the one with the dark thoracic dorsum herein listed as a variety, but my material is so scanty that it is impossible for me to arrive at a definite conclusion on the matter. The females before me appear to be a little more robust, with the anterior thoracic width greater, than the Tasmanian form.

Localities: Eungella, 45 miles west of Mackay, Queensland, 1,400-2,000 feet, 13-25 Sept., 1923 (Goldfinch); Sydney, N.S.W., 15 Sept., 1923; Dinner Creek, Ravenshoe, N.Q. (Sherrin).

Calliphora ochracea, form nigrithorax nov.

This is the Tasmanian form, which differs as stated in the key and above paragraph. Whether or not this is *hyalipennis* Macquart is immaterial as the latter name is a homonym, a fact previously pointed out by Hardy.

Length, 10-11 mm.

Type, Mangalore, Tasmania, 15 March, 1914.

Calliphora tibialis Macquart.

Mém. Soc. Sci. Lille, 1844, p. 323 (1846); *Dipt. Exot.*, Suppl. 1, p. 195, 1846.

Apparently one of the commonest and most widely distributed species in eastern Australia. Readily distinguished from any other species in the genus by the reddish tibiae, entirely pollinose abdominal dorsum, and the lack of yellow hairs on abdomen and pleura. In the colour of the pollen on abdomen it resembles *auriventris* described on a subsequent page of this paper. Quite variable in size, running from 6 to 11 mm. in length.

Many specimens from New South Wales.

I believe that *Calliphora tessellata*[1] Macquart is the same species as *tibialis*.

Calliphora stygia (Fabricius). (Text-figure 5.)

Spec. Ins., ii, p. 438, 1774.

I do not know if Patton made certain when he examined the type of this species whether the eye facets in that specimen are enlarged or not, but accept his assignment of specific names merely as a tentative course, definite decision being dependent upon a careful examination of types. It appears highly probable to me that both species may have been described, as they are widely distributed,

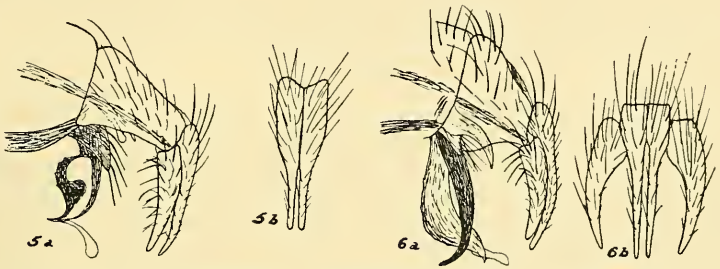
[1] *Mém. Soc. Sci. Lille*, 1842, p. 287 (1843); *Dipt. Exot.*, ii, pt. 3, p. 130, pl. xv, fig. 6, 1843.

and there are several so-called synonyms listed under *stygia*. In the meantime the names accepted herein may be used.

Hardy has expressed the opinion that *hilli* Patton is an aberration of *stygia*, and notes that "both forms are to be bred in Brisbane under conditions that point to the progeny being from the same parent . . . . I have not been able to ratify or refute this opinion . . . ". In this connection it appears pertinent to indicate that it is unwise to conclude that only one species of this genus is present in lots reared from even a limited amount of food, several species of this and allied genera often occurring in the same pabulum.

Dissection of the males of the two forms points to the fact that they are distinct species. The male hypopygium of *stygia* is figured herein (Text-fig. 5).

Localities: Sydney, Kuringgai, Blue Mts., Kosciusko, N.S.W.; and Ruapehu, New Zealand.



Text-figure 5. Hypopygium of *Calliphora stygia*. a, side view; b, upper forceps from behind.

Text-figure 6. Hypopygium of *Calliphora hilli*. a, side view; b, both forceps from behind.

CALLIPHORA HILLI Patton. (Text-figure 6.)
Phil. Jour. Sci., 1925, xxvii, p. 400.

As indicated under the preceding species this one probably has had some other name given to it before Patton described it. The characters listed in the key readily distinguish it from *stygia* as herein accepted, and the hypopygium is quite distinct from that of its ally (Text-fig. 6). I have before me two females from Eungella, Queensland, which have three pairs of presutural acrostichals, but they have the narrow frons and orbits of *hilli*, and evidently belong here, a conclusion strengthened by the fact that a male of *hilli* was taken along with them. I dissected the male to make certain of its identity.

Localities: Sydney; Barrington Tops, Dec., 1921 (G. Goldfinch), N.S.W.; Eungella, 45 miles west of Mackay, Queensland (Goldfinch).

The records may point to this being a more northern form but I have before me females from New Zealand that are referable here, and Hardy records it from Tasmania.

CALLIPHORA FUSCOFEMORATA, n. sp.

Male.—Head fuscous, lower portion of parafacials, anterior part of cheek beyond the raised area, lower part of face, the palpi, and antennae, brownish yellow, third antennal segment darkened apically; occiput, raised part of cheeks, and the orbits, grey dusted, a paler patch of dust opposite bases of antennae on parafacial; hairs on lower half of occiput and on posterior half of cheeks yellow.

Thorax black, with slight grey dusting, the dorsum faintly vittate, when seen from the side the postsutural area has a narrow central dark vitta, and on each side between the acrostichals and dorsocentrals a small dark spot at middle; many of the pleural hairs yellow, but those on mesopleura anterior to the bristles dark. Abdomen honey yellow, with a broad violet-blue patch on middle of basal three tergites which is not sharply outlined laterally, the fourth tergite densely yellowish grey dusted, with distinct checkering, the dust obscuring the ground colour; most of the ventral hairs and bristles yellow. Coxae and femora fuscous, the latter yellow at bases of hind pair; tibiae honey yellow, hind pair slightly darkened at bases; tarsi black; bristles at bases of ventral surfaces of hind femora yellow, the others black. Wings brownish hyaline. Calyptrae pale brown. Halteres yellow.

Frons at narrowest point about as wide as anterior ocellus; parafacial about as wide as third antennal segment; hairs on facial ridges extending to above middle. Posterior sublateral bristle lacking. Abdomen robust. Legs normal. Apical section of fourth vein beyond angle distinctly curved.

Length, 7 mm.

Type, Kuranda, Queensland (F. P. Dodd).

Calliphora augur (Fabricius).

Ent. Syst., iv, p. 321, 1775; *oceaniae* Rob.-Desv., *Essai Myod.*, p. 438, 1830; *villosa* Rob.-Desv., *id.*, p. 437; *lateralis* Macq., *Mém. Soc. Sci. Lille*, 1842, p. 291 (1843); *Dipt. Exot.*, ii, pt. 3, p. 134, 1843; *rufiventris* Macq., *Mém. Soc. Sci. Lille*, 1846, p. 98 (1847); *Dipt. Exot.*, Suppl. 2, p. 82, Pl. v, fig. 5, 1847.

This species differs from the preceding one in having the head much paler, the lower half of occiput, entire cheeks, lower half of parafacials, and the face being orange yellow. The pleura are quite densely yellowish dusted and appear paler than the dorsum, the humeral angles are yellowish, the dorsum is whitish dusted and on it there is no trace of the spot between the postsutural acrostichals and dorsocentrals. The dorsocentral blue mark on abdomen is quite sharply limited laterally. Coxae, femora, and tibiae orange yellow, tarsi black, ventral bristles on hind femora of male black.

Structurally similar to the preceding species, the posterior sublateral bristle usually lacking; male hypopygia not dissected in either species.

Length, 8-11 mm.

I have before me specimens of both sexes from Sydney, N.S.W.

Two females without more definite locality than Australia differ from those of typical *augur* in having the dorsal blue mark on abdomen much broader, the third tergite being almost entirely blue dorsally, and the fourth is entirely blue with only slight whitish dusting which does not obscure the ground colour. These may belong to a distinct species, but without males of each for dissection I cannot give a definite decision either way so leave them temporarily as *augur*.

Patton lists a number of synonyms of *augur* in his recent paper and it appears probable that further examination of the types of the species so listed may result in the discovery that they do not really all belong to the same species. Meanwhile the only course open to me is to accept his findings. The following two species belong to the same group as the preceding two.

Calliphora macleayi, n. sp.

Male and female.—Head coloured as in *fuscofemorata*, but the cheeks not so much darkened. Thorax shining, with a violet tinge, whitish dusted, and with

mere traces of vittae on dorsum; pleura not shining and much more densely yellowish grey dusted than dorsum, mesopleura yellow haired on lower half. Abdomen honey yellow, broadly violet-blue on centre of dorsum of all tergites, which colour is sharply limited laterally and widened on posterior margin of visible tergites 1 to 3, no dense dust on fourth, the surface, like that of other tergites, distinctly shining; most of ventral hairs and bristles yellow. Coxae, femora, and tibiae honey yellow, tarsi black; femoral hairs and bristles yellow basally. Wings hyaline. Calyptrae and halteres yellow.

Frons in male a little wider than in *fuscofemorata*, the head similar in other respects. Thorax with three pairs of presutural acrostichals, and a distinct posterior sublateral bristle. Otherwise similar to *fuscofemorata;* hypopygium not dissected.

Length, 7-9 mm.

Type male, allotype and one male and one female paratype, Eungella, 45 miles west of Mackay, Queensland, 1,400-2,400 feet, 13-25 Sept., 1923 (Goldfinch).

Calliphora centralis, n. sp.

Male.—This species has the head coloured as *augur*, the cheeks being entirely yellow, but the third antennal segment is paler than in that species. The thorax is bluish black on dorsum, more metallic posteriorly, with whitish dusting, and more noticeably vittate than the other species, especially anteriorly; the humeri are yellow, and the pleura are quite densely yellow dusted. Abdomen honey yellow, with a narrower blue-green stripe on basal three tergites, and none on fourth, or only a trace in centre of the dark colour. In other respects similar to *macleayi;* hypopygium not dissected.

Length, 9 mm.

Type, Eungella, 45 miles west of Mackay, Queensland, 1,400-2,400 feet, 13-25 Sept., 1923 (Goldfinch).

A female which I take to belong to this species has the thorax more densely whitish dusted on dorsum, and the ground colour of the pleura largely yellow.

Locality: Townsville, Queensland (F. H. Taylor).

A second female agrees more closely with the male in colour of the thorax, but has the fourth tergite overcast with a metallic blue-green tinge.

Locality: Upper Lansdowne, N.S.W., 25 Febr., 1921.

None of the species treated hereinafter have any yellow colour on either the thorax or abdomen, and all of them have entirely black legs, forming a very difficult group to distinguish specifically. Only a careful examination of specimens and more especially an examination of the male genitalia will serve to identify them in the adult stage but corroborative evidence of specific value may be found either in the larval stages or in the habits of the forms involved.

Calliphora sp.

Female.—I have some doubt as to the specific identity of this form. It may be merely an aberrant form of one of the other species dealt with in this paper, but I have no means of checking this up so leave it without a definite name meanwhile.

In colour it closely resembles *clarki* and *accepta*, with the strongest possibility that it belongs to the latter.

Locality: Botany Bay, N.S.W. (H. Petersen).

Calliphora dispar Macquart.

Mém. Soc. Sci. Lille, 1844, p. 323 (1846); *Dipt. Exot.*, Suppl. 1, p. 195, 1846; *C. pubescens* Macq., *Mém. Soc. Sci. Lille*, 1850, p. 215 (1851); *Dipt. Exot.*, Suppl. 4, p. 242.

I assign to this species a female specimen which is somewhat similar to the one mentioned above, but it is fully 10 mm. in length, has the thorax more noticeably whitish dusted and less evidently vittate, the abdomen brassy green instead of metallic blue, and quite conspicuously, though not densely, white dusted and slightly checkered; the bases of wings and calyptrae yellowish.

Locality: Uralla, N.S.W.

This is the only species before me that appears to agree with Patton's interpretation of *dispar* Macquart.

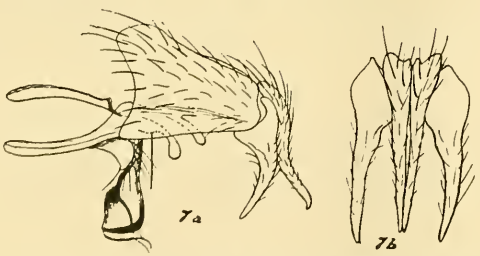
Calliphora apicalis, n. sp.

Male.—Head fuscous; interfrontalia velvety black, orbits brownish grey dusted, the dusting extending over parafacials to below middle of eye and presenting no conspicuous spot opposite bases of antennae; lower margin of face and the cheek at vibrissal angle rufous, raised part of cheek fuscous, with grey dust; antennae black, apex of second and extreme base of third segment reddish; palpi orange; hairs on centre of occiput and hind margin of cheeks golden yellow, the others black. Thorax black, with a blue cast, dorsum slightly white dusted and very faintly vittate. Abdomen dark metallic blue, with whitish dusting on basal three tergites which is densest laterally and leaves a narrow dark dorsocentral vitta, fourth tergite so densely yellow dusted that the ground colour is hidden, and the segment is conspicuously differentiated from the others. Legs black. Wings greyish hyaline, not yellow at bases, both basal costal scales black. Calyptrae brown, fringes yellowish. Halteres yellow. Coverings of both spiracles brownish yellow.

Head as in *erythrocephala* Meigen; narrowest part of frons about as wide as third antennal segment; eye facets slightly enlarged above; parafacial as wide as third antennal segment. Thorax with the bristling as in *erythrocephala*, the posterior sublateral bristle strong; a fine additional notopleural bristle present in the type. Apical bristles on all except first visible tergite long but fine, the disc of fourth tergite with numerous long fine bristles; hypopygium not dissected, but exposed in type so that the paired forceps are seen to be similar to those of *hilli*. Legs as in *erythrocephala*. Apical section of fourth vein beyond angle distinctly bent.

Length, 9·5 mm.

Type, Kosciusko, N.S.W., 7 Dec., 1922 (Goldfinch).



Text-figure 7. Hypopygium of *Calliphora robusta*. a, side view; b, forceps from behind.

CALLIPHORA ROBUSTA, n. sp. (Text-figure 7.)

Male.—The type specimen of this species is more robust than *apicalis*, with a more rotund abdomen, and is not so brightly coloured, the thorax being almost black, slightly obscured by whitish dusting, and the abdomen is greenish black on all tergites, with slight even whitish dusting which is most conspicuous laterally. The wings are yellowish at bases.

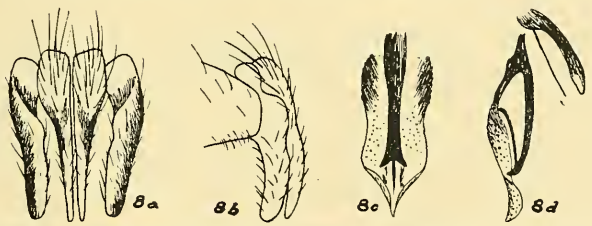
The area between the raised portion of cheek and the vibrissal angle in type has numerous hairs on it while in *apicalis* this portion is bare. Posterior sublateral bristle present but weak; only two notopleural bristles present. Hypopygium as Text-fig. 7. In other respects similar to *apicalis* except that the abdominal hairs and bristles are much shorter and weaker.

Length, 10 mm.

Type, Kosciusko, N.S.W., 7 Dec., 1922 (Goldfinch).

CALLIPHORA XANTHOCERA, n. sp. (Text-figure 8.)

Male.—Head black, orbits white dusted, a large white dusted mark on parafacial opposite basal half of antenna, area between vibrissal angle and raised part of the cheek, as well as lower margin of face, rufous; basal two antennal segments fuscous, second segment rufous at apex, third bright orange coloured, extreme apex browned; palpi orange coloured; central part of occiput with yellowish hairs, the other hairs on head black. Thorax as in *erythrocephala*, the fine hairs black. Abdomen quite brilliant metallic blue-green, like that of a *Lucilia*, with slight whitish dusting on the incurved lateral portions of the tergites. Legs black. Wings greyish hyaline, darker at bases; both basal costal scales fuscous. Calyptrae dark brown, the fringes pale. Halteres brownish.



Text-figure 8. Hypopygium of *Calliphora xanthocera*. a, forceps from behind; b, forceps from the side; c, apex of penis from below; d, apex of penis from the side.

Frons as in *erythrocephala;* parafacial about as wide as third antennal segment, the latter shorter and wider than in most related species; arista haired on little more than the basal half. All sublateral bristles of thorax long; an additional bristle between the normal two notopleurals; scutellum with about twelve bristles. Abdomen with the hairs on second visible tergite dense except on middle, those on third much sparser, longer, and stronger, the apical bristles on this tergite long and rather strong, fourth tergite with long setulose hairs on disc which are mostly almost as long as the apical bristles; ventral hairs longest on second and third sternites; hypopygium as Text-fig. 8. Fore tibia with two median posterior bristles; mid tibia with from 3 to 5 anterodorsal and posterodorsal bristles. Apical section of fourth vein distinctly curved beyond the angle.

Length, 7 mm.

Type, Kosciusko, N.S.W., 5 Dec., 1921.

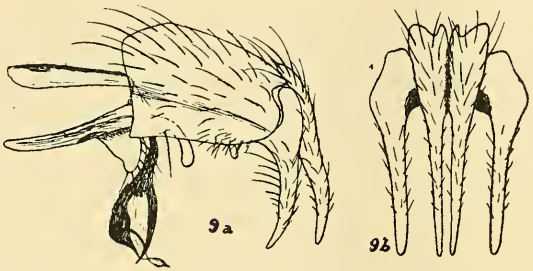
A female before me differs from the above type in having the third antennal segment narrower and much more extensively blackened, the fore tibia with but one median posterior bristle, and the fourth vein straighter on apical section beyond the angle. It may really belong to this species as it has the additional bristle between the two notopleurals, and otherwise closely resembles the male.

Length, 6·5 mm.

Locality: Kosciusko, N.S.W., 7 Dec., 1922 (Goldfinch).

CALLIPHORA AUSTRALICA, n. sp. (Text-figure 9.)

Male and female.—This species closely resembles the preceding one but is larger, has the third antennal segment mostly black, lacks the additional noto-



Text-figure 9. Hypopygium of *Calliphora australica*. a, side view; b, forceps from behind.

pleural bristle, and has the hypopygium as Text-fig. 9. The colour of the abdomen is the same in both species, which distinguishes them from *robusta* and most other species of the genus. Fore tibia with but one median posterior bristle.

Length, 9-11 mm.

Type and allotype, Kosciusko, N.S.W., 7 Dec., 1922, and 14 Mar., 1920, 5,000 feet, respectively; male paratype, Blackheath, N.S.W., 24 Dec., 1921; female paratypes, Fish River, N.S.W., 25 Mar., 1923, and Blue Mts., N.S.W., 28 March, 1923.

CALLIPHORA ERYTHROCEPHALA (Meigen).

Syst. Beschr. Eur. Zweifl. Ins., v, p. 62, 1826.

This species, like *Musca domestica* Linné, appears to have an almost cosmopolitan distribution. It is readily distinguished from any other species of the genus in Australia by its red cheeks, which are black haired except behind, and the dark coloured calyptrae with their white margins and fringes.

Locality: Sydney, N.S.W., 30 May, 1921. I record only the material before me.

CALLIPHORA MINOR, n. sp. (Text-figure 10.)

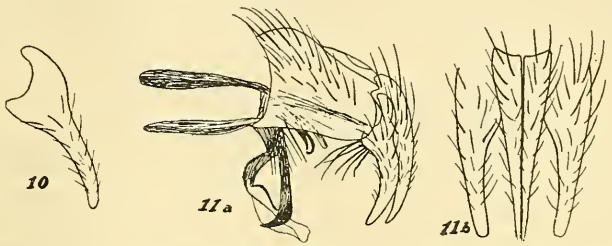
Male and female.—very similar to *accepta* in colour, but the thoracic dorsum is more evidently vittate, and the abdomen is quite distinctly white dusted, especially in the female where there are distinct checkerings, and each hair and bristle is inserted in a minute black dot.

Structurally similar to *accepta*, but the male has the outer hypopygial forceps as Text-fig. 10, the frons is at narrowest part about twice as wide as anterior

ocellus, the posterior sublateral bristle is short, and the size is less.

Length, 3·5-4·5 mm.

Type, male, Townsville, N. Queensland (G. F. Hill); allotype and two female paratypes, Darwin (G. F. Hill); one male and four female paratypes, Cairns, N. Queensland (J. F. Illingworth). The last series in United States National Museum.



Text-figure 10. Hypopygium of *Calliphora minor*, outer forceps from side.
Text-figure 11. Hypopygium of *Calliphora plebeia*. a, side view; b, forceps from behind.

CALLIPHORA PLEBEIA, n. sp. (Text-figure 11.)

Male.—A black species, with the antennae in variable proportion reddish yellow, sometimes entirely so; palpi rufous yellow; orbits, parafacials, and cheeks densely yellowish grey dusted; thoracic dorsum slightly bronzy, with quite evident whitish dust, and rather distinctly vittate; abdomen bronzy or greenish black, with silvery white dusting, which is distinctly checkered. Wings hyaline. Legs black. Calyptrae whitish. Halteres yellow.

The eyes are much closer together than in any other species in this segregate, and the facets are quite noticeably enlarged on upper anterior part. Posterior sublateral bristle present. Bristles on apex of second abdominal segment strong on sides only, those at apex of third stronger than those at apex of fourth, the discal bristles on latter long, but weak and hair-like. Fore tibia with one median posterior bristle. Hypopygium as Text-fig. 11. Apical section of fourth vein bent beyond angle.

Length, 7-10 mm.

Type and four paratypes, Cairns, N. Queensland (J. F. Illingworth). One labelled "flowers", the others "ex corn".

CALLIPHORA AURIVENTRIS, n. sp.

Female.—Very similar to *tibialis* Macquart. Frontal orbits and upper part of parafacials with yellow dust; antennae and palpi testaceous yellow, third segment of former slightly browned; cheeks fuscous on raised part, with yellowish grey dust and black hairs. Thorax black, with whitish dusting on dorsum, and the usual vittae almost indistinguishable; pleura coloured as dorsum, many of the fine hairs yellow, especially on prosternum, centre of propleura, round stigmatal bristle, on pteropleura, and hind and lower portions of sternopleura. Abdomen black, with a bronzy cast, but the dorsum almost totally obscured by dense brassy or golden dusting which is irregularly checkered or variegated, the hairs black. Legs black. Wings quite conspicuously yellow at bases. Calyptrae and halteres orange-yellow.

Head normal. Thoracic dorsum with the surface hairs very fine and short; posterior sublateral bristle quite prominent; acrostichals 2 + 3; both pairs of intra-alar bristles strong. Legs normal. Fourth wing vein quite evenly curved beyond angle.

Length, 11 mm.

Type, Fish River, N.S.W., 25 Mar., 1923.

The colour of the abdomen is very similar to that of *tibialis*, but the legs are entirely black, and the pleural hairs are largely yellow, which is not the case in that species.

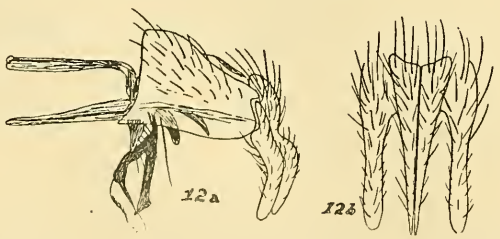
Calliphora clarki, n. sp. (Text-figure 12.)

Male.—A species with much the same habitus as some of the European forms at present placed in *Onesia*. Head black, orbits white dusted, when seen from the side the parafacial is black at base of antenna, has a large white dusted spot above middle, and is blackish below; cheeks and occiput yellowish grey dusted; base of third antennal segment broadly rufous; palpi rufous. Thorax bluish black, slightly white dusted, and distinctly vittate, in type with a dark line or vitta connecting the pair in each series of presutural dorsocentrals when seen from the side and behind. Abdomen quite conspicuously metallic green, but with distinct white dusting which is almost evenly distributed on dorsum. Legs black. Wings smoky hyaline, veins dark. Calyptrae brownish, margin of lower one yellowish. Halteres brownish yellow.

Narrowest part of frons over twice as wide as anterior ocellus; eye facets slightly enlarged on upper half anteriorly; parafacial distinctly wider than third antennal segment; vibrissal angle produced. All three sublateral bristles distinct. Abdomen broadly ovate; hypopygium as Text-fig. 12. Fore tibia with two posterior median bristles; posterior surface of fore femur longer haired than usual. Apical section of fourth vein distinctly curved beyond angle.

Length, 7 mm.

Type, Perth, Western Australia, 1917 (J. Clark).



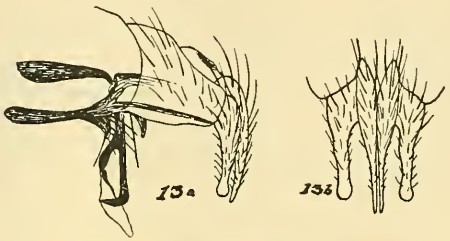
Text-figure 12. Hypopygium of *Calliphora clarki*. a, side view; b, forceps from behind.

Calliphora accepta, n. sp. (Text-figure 13.)

Male and female.—Similar to *clarki*, differing essentially as noted in the key to species. Hypopygium of male as in Text-fig. 13. The males have usually two posterior bristles near middle of fore tibia, but in the females I have before me there is but one such bristle. The abdomen is but slightly white dusted on dorsum and the species has more the habitus of a *Lucilia* than a *Calliphora*.

Length, 6-7·5 mm.

Type, male, allotype, one male and one female paratype, Botany Bay, N.S.W. (H. Petersen); one male paratype, Como, N.S.W., December, 1923, swept from flowers (H. Petersen); two male and one female paratypes, Blue Mts., N.S.W.; one male paratype, Mooroopna, Victoria, 31 Dec., 1923 (F. E. Wilson); one male paratype, Sydney, N.S.W., 16 Oct., 1921.



Text-figure 13. Hypopygium of *Calliphora accepta*. a, side view; b, forceps from behind.

CALLIPHORA METALLICA, n. sp. (Text-figure 14.)

Male.—A larger and more robust species than the preceding one, with the abdomen more noticeably white dusted, and the second abdominal tergite without the well developed central bristles on hind margin. The hypopygium is as shown in Text-fig. 14, but in other respects the two species are very similar.

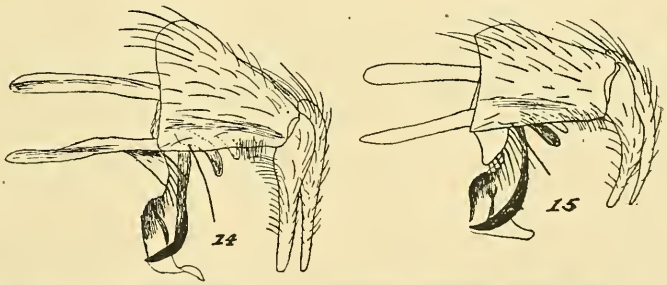
Length, 9-10 mm.

Type, Woolgoolga, N.S.W., 27 Jan., 1923; paratype, Orange, N.S.W., 21 Apr., 1923.

CALLIPHORA ASSIMILIS, n. sp. (Text-figure 15.)

Male and female.—More like *plebeia* in colour and habitus than like the preceding species, but the eyes have the facets but little enlarged on upper half, the frons is wider in male, and the parafacials are not so evenly and densely dusted. The hypopygium of male is as shown in Text-fig. 15.

Length, 8-9 mm.

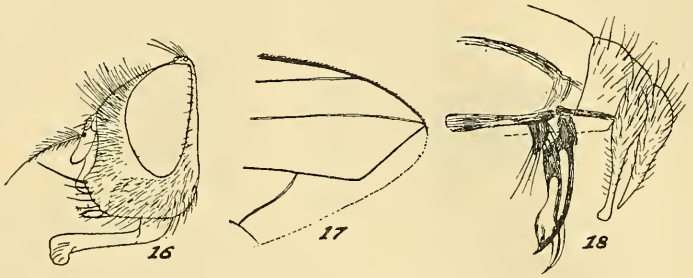


Text-figure 14. Hypopygium of *Calliphora metallica*, side view.
Text-figure 15. Hypopygium of *Calliphora assimilis*, side view.

Type, allotype, and one male paratype, Marwood, near Mackay, Queensland, Jan., 1924 (W. C. Harvey).

It must be remembered that in my opinion there are more species belonging to this last section than are included in the above key and descriptions. Colour

descriptions are almost valueless here and only very careful comparative work and hypopygial examinations will disclose just how many there really are in Australia, facts which are impossible of my ascertaining from the small amount of material now in my hands.



Text-figure 16. Head of *Pollenia hirticeps*, side view.
Text-figure 17. Apex of wing of *Pollenia hirticeps*.
Text-figure 18. Hypopygium of *Pollenia hirticeps*, side view.

Genus Pollenia Robineau-Desvoidy (1830).

This genus is represented in Australia and New Zealand by species which differ from the genotype, *rudis* Fabricius, in having the extreme basal portion of the stem vein on under side without evident hairs apically. This segregate if entitled to generic rank will bear the name *Sepimentum* Hutton, but I consider it as at best entitled to subgeneric rank.

The head (Text-fig. 16) is quite different from that of typical species of *Calliphora* and the lower calypter is bare. The supraspiracular ridge and centre of propleura are bare, characters which distinguish the Australian species from those of *Lucilia*. In the Australian species of *Pollenia* the prosternum is also bare. The venation of the apex of wing is quite different from that of *Anthracomyia* (Text-fig. 17). There is but one Australian species before me.

Pollenia (Sepimentum) hirticeps, n. sp. (Text-figures 16, 17 and 18.)

Male and female.—Head black, grey dusted on orbits, raised part of cheeks, and upper parafacials, the anterior part of cheek and lower part of parafacial reddish, and not grey dusted; antennae reddish testaceous, third segment more or less browned apically; arista black; palpi coloured as antennae; hairs on frons, parafacials, and cheeks, black, some of those on lower occiput and a few on hind part of cheek yellow. Thorax black, with a bluish cast, the dorsum thinly whitish dusted and almost entirely without vittae; dorsal hairs all black, the curled or crinkly yellow hairs confined to parts of pleura. Abdomen variable in colour, black with cupreous or blue lustre, or metallic bluish black, with thin regular whitish dusting on dorsum and no markings, the hairs all black. Legs black. Wings slightly smoky, darkest at bases. Calyptrae and halteres brown.

Male.—Head in profile as in Text-fig. 16; frons at narrowest point not wider than third antennal segment, the anterior half forming a large triangle, orbital hairs long and strong, in several series, those on the parafacials also long and curved, the entire vibrissal area sparsely short haired; antennae distinctly separated at base, but no carina on face; longest hairs on arista not longer than width of third antennal segment, the latter rather narrow. Thorax with 2 + 3

dorsocentrals, 2 + 2 acrostichals, two pairs of intra-alars, the prealar long, two bristles on the presutural area, and two sternopleurals. Abdomen narrowly ovate; hypopygium as in Text-fig. 18. Legs as in *Calliphora erythrocephala* Meigen.

Female.—Frons at vertex one-third of the head width, much widened to anterior margin, orbits with a series of quite long, strong, incurved bristles along the inner margin, several series of shorter forwardly directed setulae laterad of these, a quite prominent forwardly and outwardly directed bristle just in front of level of anterior ocellus, and an outwardly directed one between it and the vertical bristles. Abdominal tergal bristles weak.

Length, 6-8 mm.

Type, male, allotype, and one female paratype, Blue Mts., N.S.W.; paratype males, Blackheath, N.S.W., and Mt. Lofty Ranges, S. Aust.

Genus Anthracomyia, novum.

This genus is rather similar to *Pollenia*, but there are no soft curled or crinkly hairs on thorax, and the venation of the wing is quite different apically (Text-fig. 19). Genotype, *A. atratula*, n. sp.

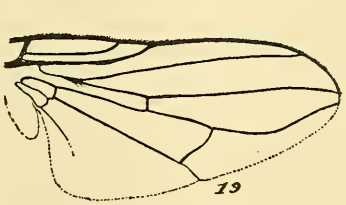
Anthracomyia atratula, n. sp. (Text-figure 19.)

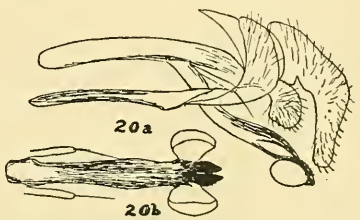
Male.—Black, shining. Face, parafacials, and raised part of cheeks, whitish dusted; antennae and palpi black; cephalic hairs all black. Thorax slightly whitish dusted on dorsum, without evident vittae. Abdomen glossy black, when seen from behind with slight, even, whitish dusting and a trace of a dark central line basally. Legs black. Calyptrae fuscous. Halteres brownish yellow.

Frons linear above, forming a triangle on anterior half, orbits on widened part of frons gradually widening anteriorly, with a series of long setulose hairs along inner margins and a few fine short hairs laterad of these; parafacial about as wide as third antennal segment, with rather long hairs almost to lower margin of eye; the cheek adjacent to vibrissal angle almost bare; one or two hairs above vibrissae; arista haired almost to apex, the longest hairs about as long as width of third antennal segment; palpi slender. Thorax with 2 + 3 dorsocentrals and apparently the same number of acrostichals, two pairs of long intra-alars, a long prealar, two bristles on presutural area, no upper anterior bristle on mesopleura, and, like the preceding genus, no hairs on the lower anterior half of pteropleura. Abdomen narrowly ovate, the dorsal hairs rather sparse, long and setulose. Legs as in last species, the ventral median bristle present on mid tibia; fore legs in type missing. Wing venation as in Text-fig. 19.

Length, 4 mm.

Type, Allowrie, Killara, N.S.W., 30 Jan., 1921 (Waterhouse).





Text-figure 19. Wing of *Anthracomyia atratula.*

Text-figure 20. Hypopygium of *Chrysomyia megacephala.* a, side view; b, penis from above.

This small species is represented by a male in damaged condition, but it is so clearly distinct from any other species known to me that I have decided to describe it. The character of hairs on the lower anterior half of pteropleura is quite an important one in this group, and may be used to distinguish doubtful specimens of small species of *Calliphora* in which the hairs on the upper surface of lower calypter are not readily distinguishable from this and the preceding genus, the hairs being always present on lower anterior half of pteropleura in *Calliphora*.

Genus Lucilia Robineau-Desvoidy (1830).

This genus is of considerable economic importance in Australia because of the habits of some of the species which feed in the larval stages in the matted wool of sheep, and penetrate the flesh. There are known to me four well distinguished segregates of the genus, which I accept as subgenera. Three of these I have seen from Australia, and below I append a key for their recognition, the other occurs only in the Oriental region so far as I am at present aware. I have published elsewhere a key to all four subgenera, but this is not readily available to Australian students. It is worth mentioning that in many species of the genus there are sparse microscopic hairs on the face, a character found also in *Phumosia* Robineau-Desvoidy, but in one or two species of the latter the hairs are quite prominent.

Key to Australian Subgenera.

1. The convexity immediately above metathoracic spiracle with conspicuous fine erect hairs ..... *Hemipyrellia* Townsend
   The metathoracic convexity without erect fine hairs 2
2. Sclerite at extreme base of stem vein on under side of wing with short setulose hairs apically ..... *Lucilia* Robineau-Desvoidy
   Sclerite at extreme base of stem vein on under side of wing without evident hairs ..... *Phenicia* Robineau-Desvoidy

Subgenus Hemipyrellia Townsend (1918).

In addition to having erect fine hairs on the metathoracic convexity this subgenus has setulose hairs on the basal sclerite of stem vein below.

I have seen five species of the subgenus, two of which occur in Australia.

Lucilia (Hemipyrellia) fergusoni Patton.

Phil. Jour. Sci., 1925, xxvii, p. 403.

This is the only species of the subgenus known to me in which there is any yellow colour on the abdomen, and in which the legs are not entirely black. It bears a striking superficial resemblance to *Chrysomyia incisuralis* Macquart, but is a true *Hemipyrellia*. Patton's description is reliable as to colour, but the essential characters for the recognition of its subgeneric status are not mentioned by him. The setulose hairs on basal sclerite of first vein below are yellow, which is unique, as is also the yellow colour of the head, pleura, and most of the abdomen.

Localities: Sydney, N.S.W., April, October, and November; Eungella, 45 miles west of Mackay, Queensland, 1,400-2,000 feet, 13-25 Sept., 1923 (Goldfinch).

Lucilia (Hemipyrellia) cyaneomarginata Macquart.

Mém. Soc. Sci. Lille, 1850, p. 221, (1851); *Dipt. Exot.*, Suppl. 4, p. 248.

I have identified as this species one which occurs commonly in the Philippines, Straits Settlements, and Federated Malay States. I have now before me a male and female from Queensland.

It should be noted that Patton records under *Lucilia nosocomiorum* Doleschall a number of synonyms including *cyaneomarginata* Bigot. Bigot described a *cyaneocincta*, but I can find no *cyaneomarginata* Bigot. I have accepted *nosocomiorum* as the name for a larger species which is apparently the one identified as such by Patton, but it belongs to the subgenus *Lucilia*.

In *cyaneomarginata* the frons of the male is distinctly wider than third antennal segment, the thorax has two pairs of postsutural acrostichals, and the abdomen has conspicuous dark blue apices to the tergites. Length, 7-8·5 mm.

Localities: Cairns, N. Queensland, carrion (J. F. Illingworth).

Subgenus Phenicia Robineau-Desvoidy (1830).

The members of this subgenus known to me have the eyes of the males more widely separated than is the rule in the other two subgenera occurring in Australia, and the basal sclerite of stem vein is bare.

There are two species known to me, both of which I have seen from Australia.

Lucilia (Phenicia) sericata Meigen.

Syst. Beschr. Eur. Zweifl. Ins., v, p. 53, 1826.

This bright metallic blue-green species has the ventral surface of abdomen in male only moderately setulose, and in both sexes the dorsum of abdomen is without conspicuous white dusting.

I have before me many examples from Australia, some labelled, "Bred from Wool."

Lucilia (Phenicia) cuprina Wiedemann.

Aussereurop. Zweifl. Ins., ii, p. 654, 1830; *pallifrons* Bigot, *Ann. Soc. Ent. France*, 1877, p. 257.

A coppery or bronzy coloured species with very noticeable whitish dusting on thorax and abdomen. The ventral surface of abdomen in the male is furnished with quite dense long conspicuous bristles.

I identify as this species a female from Kuranda, Queensland (F. P. Dodd).

Subgenus Lucilia Robineau-Desvoidy.

This subgenus is represented in the material before me by two rather aberrant species. The genotype, *caesar* (Linné) has quite numerous fine hairs on central part of propleura, while the other two have no such hairs or there are but one or two such on anterior margin. The face in some of the species is usually bare, while in others it is invariably furnished with short sparse hairs in middle.

I present below a key for the identification of the two species I have seen from Australia and include *caesar*, which I have seen no Australian specimens of so far.

Key to Species.

1. Face invariably with some microscopic black hairs centrally from lower to upper extremity; abdomen metallic blue, with dark apices to tergites; lower calypter dark brown; centre of propleura bare or with one or two weak hairs on anterior margin ..... *nosocomiorum* Doleschall

   Face bare or with some inconspicuous microscopic hairs near lower margin; abdomen metallic blue-green or blue, without dark apices to tergites 2

2. Antennae black or fuscous, third segment reddish at base; frons in female about as wide as length of antennae; centre of propleura with quite evident pale hairs; calyptrae pure white ..... *caesar* (Linné)

   Antennae orange yellow; frons in female much narrower than length of antennae; centre of propleura bare, at most with a fine hair or two on anterior margin; lower calypter brownish yellow ..... *flavicornis*, n. sp.

Lucilia (Lucilia) caesar Linné.
Fauna Suec., p. 451, 1761.

A brilliant metallic blue-green species which frequently has a golden tinge on abdomen and thorax. There are no traces of dark apices to tergites in either sex.

The species has been recorded from a wide range of localities, but as a matter of fact it is not so commonly found as the records would indicate. I have seen no Australian specimens in either the material sent to me or in the United States National Museum, where there is a good representation of the family from Australia. The characters included in the above key ought to serve to separate it from other Australian species if it does occur.

Lucilia (Lucilia) nosocomiorum Doleschall (1857).
Nat. Tijdschr. Ned-Ind., 1857, xiv, p. 413.

Very similar to *caesar*, but more constantly metallic blue in colour, with dark apices to the abdominal tergites, and usually larger in size and more robust, averaging over 8 mm. in length.

Localities: Kuranda and Townsville, Queensland.

I can detect no outstanding differences in the structure of the Australian specimens and some from Sumatra and the Philippine Islands. The male hypopygia agree, and though the anterodorsal surface of the hind tibia in the Australian males has a regular series of short setulae and there is at least one outstanding bristle in the series on those from the Orient I consider it highly probable that *metilia* Walker, which is the name given to the latter, is the same as *nosocomiorum*, the latter name having priority.

Lucilia (Lucilia) flavicornis, n. sp.

Female.—Frons black, slightly reddish in front, upper orbits and ocellar region slightly shining and faintly bluish; occiput black, grey dusted, cheeks and face orange coloured, white dusted, cheeks slightly darkened posteriorly, face darkened above; antennae entirely orange-yellow, basal two segments slightly darker; palpi orange. Thorax metallic violet-blue, dorsum rather evenly white dusted, the dusting most noticeable when seen from behind, and without outstanding vittae. Abdomen concolorous with thorax, but the dorsum on disc green, white dusted on incurved lateral portions of tergites. Legs dark brown or fuscous, femora with bluish tinge, trochanters and tibiae brownish yellow. Wings greyish hyaline. Lower calypter brownish yellow. Halteres yellow.

Frons at vertex hardly over one-fifth of the head width, and narrower than length of antennae; face bare. Thorax as in *caesar*, but the propleura is bare on centre. In other respects as *caesar*.

Length, 9 mm.

Type, Cairns, N. Queensland, from dung (A. P. Dodd).

I can find no description that appears to fit the above species and though I do not ordinarily undertake to describe species from single females in revising a group it devolves upon one to designate all material by names which will serve to distinguish them until final adjustments have been made.

Genus Paratricyclea Villeneuve (1913).

This genus is represented in the material before me by one species which belongs to the subgenus *Caiusa* Surcouf. It is possible that it has been described by one or more of the older authors, but it is absolutely impossible to make certain

of most of their species, and even after a number of attempts have been made by recent workers to elucidate their types we are still very much in the dark as to their exact identity, and as to even their generic positions. I consider it much better to describe any species as new which does not agree absolutely with the description of any of those species and do not consider it unscientific to do so even in cases where there is an apparent agreement if the specimens are from different localities within the same faunal region. Only a careful examination of types by some competent specialist will definitely settle specific identities, and prevent the erroneous recording of species from localities in which they do not occur.

Surcouf has recently described the chaetotaxy of *Phumosia analis* Macquart so thoroughly that it is clear the species is not the same as the one described herein.

PARATRICYCLEA (CAIUSA) SURCOUFI Bezzi.
Bull. Ent. Res., 1927, xvii, p. 246.

Male and female.—Shining fulvous testaceous; upper occiput, raised part of cheeks, and frontal orbits grey or fuscous, upper part of frons in female fuscous. Abdomen broadly blackish blue at apex. Legs fulvous yellow. Wings yellowish hyaline. Calyptrae and halteres fulvous.

Frons in male reduced to a line, the facets much enlarged on upper half of eye and rather sharply separated from those of lower half; frons in female a little less than one-third of the head width, anterior supraorbital strong, interfrontalia bare; face normally with some microscopic hairs in centre. Thorax with 3 + 4 dorsocentral bristles, the anterior postsutural pairs short, 1 + 2 pairs of short, widely separated, presutural, and one pair of prescutellar acrostichals; sides of scutellum haired, the hairs on ventral surface yellow; pleural hairs yellow, those on upper half of mesopleura black; sternopleurals 1 + 1. Superior hypopygial forceps of male hollowed out behind, slightly curled, and tapered to apices, the inferior as long as superior pair, stouter, and obtuse at apices. In other respects similar to *indica* Surcouf, the hind tibia with two posterodorsal bristles; no hairs at junction of humeral cross vein and subcosta, but one or two below at junction of first and second veins.

Length, 7-8 mm.

Localities: Male, Melville Island, N.T. (G. F. Hill); Darwin, N.T. (G. F. Hill); females, Stapleton, N.T. (G. F. Hill), and Marwood, near Mackay, Queensland (W. C. Harvey); original locality, Queensland (Bezzi).

In the Oriental species before me most, or all, of the hairs are black or fuscous, and the male has the superior hypopygial forceps more slender, not curled, and shorter. Macquart's species *analis* was described from New Holland but I have seen no species which could be considered as possibly this from Australia.

Genus EUPHUMOSIA Malloch (1926).

This genus, like the preceding one, belongs to the arbitrary group "Muscidae Testacea", and the genotype, *papua* Guerin, was included by Surcouf in the genus *Phumosia* Robineau-Desvoidy. I recently erected the genus *Euphumosia* for its reception.

In addition to the characters which may be culled from the key presented on a preceding page of this paper it may be mentioned that the dorsocentrals are 2 + 3, acrostichals 2 + 2, intra-alars 2 pairs, and sternopleurals 1 + 1; in the male

the frons is reduced to a mere line, the facets of the eyes are much enlarged on upper half, and there is a strong submedian ventral bristle on mid tibia in both sexes.

EUPHUMOSIA PAPUA (Guerin-Méneville).

Voy. Coquille, Zool., 1830, Insects, Pl. xxi, fig. 3; *eristaloides* Walker, *Proc. Linn. Soc. Lond.*, 1858, iii, p. 106; *calliphoroides* Walker, *Proc. Linn. Soc. Lond.*, 1861, v, p. 245; *papouana* Bigot, *Bull. Soc. Zool. France*, 1887, p. 610; *variegata* Bigot, *Bull. Soc. Zool. France*, 1887, p. 610.

A testaceous yellow species, the dorsum of thorax more fulvous and with three broad chocolate coloured vittae which are connected by a similarly wide transverse band at their hind extremities some distance from hind margin of mesonotum. Abdomen coloured as thorax, hind margins of all tergites deep black, the basal one least broadly so, anterior margins of tergites 3 and 4 narrowly black, the transverse pale fascia on each of these tergites densely whitish yellow dusted. Legs yellow, tarsi darker. Wings browned, especially along veins.

Length, 11-12 mm.

Locality: Melville Is. (W. D. Dodd).

This conspicuously marked species has been described several times, the names known to me including *eristaloides* Walker, *variegata* Bigot, and *papouana* Bigot, while Johnston and Hardy recognize in it *calliphoroides* Walker.

The species does not appear to be a common one, and nothing is known of its immature stages. There is one female in the United States National Museum.

DEXOPOLLENIA CHRYSOTHRIX Bezzi.

Bull. Ent. Res., 1927, xvii, p. 231.

This species has recently been described from N.S. Wales, but is unknown to me.

Subfamily Chrysomyiinae.

The Australian members of this subfamily are distinguished from other subfamilies by the presence of hairs, or setulae, on the posterior upper side of the stem vein of wing, and the haired upper surface of lower calypter. Only the Rhiniinae have the setulae on the stem vein, and these have no hairs on the lower calypter. In addition to these characters there are only two sternopleural bristles present (1 + 1), the stigmatal bristle is usually present and distinct, and in many species there are well developed hairs on the small knob-like protuberance below and in front of the wing base.

Patton has recently dealt with the species of *Microcalliphora*, which he did not separate from *Chrysomyia*, and he redescribed *varipes* Macquart and described two new species in the same paper. He was evidently unaware of the fact that the frons in the males of this genus is almost as wide as in the females, and his *annulipes* was described, not from a female as he states, but from a male, and undoubtedly that of *varipes* as it agrees in all particulars with that species. His *fulvipes* had previously been described by Aldrich as *flavifrons*. There are thus but two known species of the genus.

I attempt a provisional review of the species of the genera known to me herein but the paucity of material available does not lend itself to a comprehensive treatment of the group. It is highly probable that there are some more Australian species yet to be discovered. There are some species of the genus which cause

myiasis in man as well as in other mammals and which ought to be guarded against.

Below I present a synopsis of the three genera in my material now.

Key to Genera.

1. The small knob-like protuberance below and in front of wing base without any outstanding hairs ..... *Eucompsomyia,* novum.
   The small knob-like protuberance below and in front of wing base with numerous outstanding hairs 2
2. Eyes of male narrowly separated above, the frons almost linear .... *Chrysomyia* Robineau-Desvoidy
   Eyes of male widely separated above, the frons at least half as wide as either eye and but little narrower than that of female ..... *Microcalliphora* Townsend

Genus Eucompsomyia, novum.

Generic characters.—Similar to the two other genera included above, the centre of propleura, prosternum, and entire pteropleura, haired; basal sclerite of stem vein of wing on under side haired, but, like in the American genera of the subfamily, the knob-like protuberance below and in front of wing base is bare. The American genera, however, have the anterior half of the pteropleura bare, and the lower calypter in these is haired at base only, not on the entire upper surface as in the Australian genera.

Genotype, *Eucompsomyia semimetallica,* n. sp.

There are two species of this genus known to me which may be distinguished as below.

Key to Species.

Eyes of male very narrowly separated above, almost touching at middle of frons; abdomen honey yellow, second tergite centrally, third on most of disc, and all of fourth, metallic blue, with whitish dusting ..... *semimetallica,* n. sp.

Eyes of male quite widely separated above, width of frons at narrowest part about one-sixth that of head; abdomen honey yellow, with the following bluish black markings: First visible tergite with a narrow apical fascia, second with a moderately broad central mark which extends along hind margin and narrows laterally into a slender fascia, third with a still broader mark of similar nature, and fourth with a narrow incomplete central vitta ..... *latifrons,* n. sp.

Eucompsomyia semimetallica, n. sp.

Male.—Head fulvous yellow, hairs on cheeks, parafacials ,and lower half of occiput, yellow. Thorax fulvous, dorsum almost entirely violet-blue, pleura darkened on lower posterior part, metanotum blackish blue. Abdomen honey yellow, dorsum largely violet-blue, fourth tergite more greenish, and with whitish dusting. Legs fulvous, hind tibiae slightly browned. Wings yellowish hyaline. Calyptrae and halteres fulvous.

Frons linear above; eye facets a little enlarged on upper half; cheek over one-third as high as eye; palpi normal. Thorax with 2 + 4 dorsocentrals, 2 bristles on the presutural area, one behind the humerus and the other transversely placed from its hind margin; only one pair of prescutellar acrostichals present; sternopleurals 1 + 1; anterior intra-alar short. Abdomen short ovate. Tibial bristles short, similar to those of *Chrysomyia* species. Apical cross vein much curved.

Length, 7 mm.

Type, Kuranda, Queensland (F. P. Dodd).

Eucompsomyia latifrons, n. sp.

Male.—Similar to the above species but the third antennal segment largely brown, facial ridges with numerous black hairs above vibrissae which extend to above middle; pteropleura, sternopleura, and hypopleura bluish black, with grey dusting; legs yellow, with the apices of tarsi darkened; otherwise as stated in the key.

The facets are but little enlarged on upper half of eye, the parafacials are bare centrally. Thorax as in the above species, but the anterior intra-alar is absent in type. In other respects as *semimetallica* except as stated in key.

Length, 7·5 mm.

Type, Loowanna, E. Dorrigo, N.S.W., 31 Jan., 1923.

This species presents almost the same divergence from the genotype as does *Microcalliphora* from *Chrysomyia*, but I retain them both here because of lack of a knowledge of the characters of both sexes, and paucity of material.

Genus Microcalliphora Townsend (1916).

As stated on a previous page in this paper there are but two known species of this genus. I have examined both of these in the United States National Museum and give below a synopsis for their recognition.

The small size of the species and the widely separated eyes of the males ought to readily distinguish the insects even in the field. Intensive collecting may result in the discovery of yet unknown species of the genus. The female of *flavifrons* has not been described.

Key to Species.

1. Femora and tibiae entirely yellow; frons, in male at least, blackened only on the upper third, the anterior third bright yellow; fore femur in male with no conspicuous white hairs ..... *flavifrons* Aldrich

Femora largely black, tibiae partly so; frons in both sexes fuscous to anterior margin; fore femur in male with dense erect white hairs above ..... *varipes* Macquart

Microcalliphora flavifrons Aldrich.

Proc. U.S. Nat. Mus., 1925, lxvi, art. 18, p. 20; *fulvipes*, Patton, *Phil. Jour. Sci.*, 1925, xxvii, p. 410.

Known only from Gordonvale and Cairns, Queensland, the former the type locality of *flavifrons*, the latter the type locality of *fulvipes*, both of the types collected by Dr. J. F. Illingworth and sent by him to the describers.

Microcalliphora varipes (Macquart).

Lucilia varipes Macq., *Mém. Soc. Sci. Lille*, 1850, p. 222, (1851); *Dipt. Exot.*, Suppl. 4, p. 249, Pl. xxiii, fig. 4; *annulipes* Patton, *Phil. Jour. Sci.*, 1925, xxvii, p. 410.

I have already indicated that *annulipes* Patton appears to me to be this species. My specimens are from Sydney, N.S.W.; it occurs also in Queensland.

Genus Chrysomyia Robineau-Desvoidy (1830).

It must be noted that the original spelling of this genus name is *Chrysomya*, and that the emendation given above, which has been generally accepted, causes a conflict with *Chrysomyia* Macquart, a genus of Stratiomyiidae, which was erected at a later date, and which is generally given the name *Microchrysa* Loew.

This is the most generally distributed genus of the family in the Old World, and the one which is of most economic importance. As is usual in the case of species that enter into economic relations with man and domestic animals there are doubts as to the exact distribution and names of several of the species, one of them being recorded under several names and from Africa, Asia, and Australia. It is very desirable that accurate data be obtained to determine if it is one species or several that occur over this territory, but I am not in possession of material in sufficient quantities to do this work at this time. Under the species in the text I present some points which appear to call for investigation. The following key is given to facilitate identification of the four species which I recognize or have reason to accept as occurring in Australia.

Key to Species.

1. Abdomen honey-yellow, with a narrow black hind marginal band on each of the basal three visible tergites, and a broad metallic blue suffusion on disc of same tergites; legs honey-yellow, tarsi black; hairs on the knob-like process below base of wing golden yellow; calyptrae yellowish white; frons of female at vertex not over one-fifth of the head width ..... *incisuralis* Macquart
   Abdomen entirely metallic blue or green, with dark apices to tergites; legs black; frons of female over one-fifth of the head width at vertex 2
2. Calyptrae white or yellowish; coverings of both prothoracic and metathoracic spiracles white; hairs on knob-like process below wing base pale .... *albiceps* Wiedemann
   Calyptrae fuscous or dark brown, white on outer or connecting angles; coverings of both pairs of thoracic spiracles and hairs on knob-like process below base of wing black or fuscous 3
3. Facets of upper half of eyes in male exceptionally enlarged and sharply differentiated from those of lower half; a number of black setulae on vibrissal angle; hairs on fourth tergite practically all black on dorsum, the pale hairs on sides inconspicuous; base of scutellum darker than apex ..... *megacephala* Fabricius
   Facets of upper half of eyes in male only moderately enlarged; no black setulae on vibrissal angle besides the single bristle; hairs on fourth tergite practically all white in female, in male they are mixed black and pale on disc, yellow and conspicuous on sides ..... *micropogon* Bigot

Chrysomyia incisuralis (Macquart).

Mém. Soc. Sci. Lille, 1850, p. 219 (1851); *Dipt. Exot.*, Suppl. 4, p. 246, 1851; *Psilostoma incisuralis* Surcouf, *Nouv. Arch. Mus. Nat. Paris*, 1920, (5), p. 58.

Macquart originally included this species in his genus *Ochromyia* because of its yellow colour, and Surcouf erected the genus *Psilostoma* for its reception, but it differs but little in structure from the other species of the genus and is a member of *Chrysomyia* without any doubt.

The species does not occur outside of Australia so far as I know at present. My specimens are from Cairns and Eungella, Queensland, and Sydney, N.S.W.

Chrysomyia albiceps (Wiedemann).

albiceps Wiedemann, *Aussereurop. Zweifl. Ins.*, ii, p. 404, 1830; ? *rufifacies* Macq. *Mém. Soc. Sci. Lille*, 1850, p. 216 (1851); *Dipt. Exot.*, Suppl. 4, p. 243.

If this identification is correct this is the most widely distributed species of the genus, being originally described from Africa, and recorded from southern Asia, most of the islands in the Indian and South Pacific Oceans, and Australia. There is some question as to whether *putoria* Wiedemann is distinct from *albiceps*, but lack of material prevents me from arriving at a definite decision on the point. It appears worth mentioning that there is considerable variation in the colour of the hairs on the upper side of the lower calypter in my specimens.

In some these are all black, in others the black hairs are confined to the central part of disc, while in others they are all white.

I hope to be able later to decide the matter of specific relations here if I become possessed of sufficient material.

I have specimens from Queensland and New South Wales.

CHRYSOMYIA MEGACEPHALA (Fabricius). (Text-figure 20.)
Ent. Syst., iv, p. 317, 1794.

This species has been recorded as occurring in Australia but so far as my material is concerned I have not seen any specimen which agrees absolutely with those I have from the Orient. I have used in the foregoing key the characters which appear to me to be of value in distinguishing it from *micropogon*, but I am not at all satisfied that they will suffice for that purpose in all cases. I made a dissection of the hypopygia of the males of two specimens which I believed were distinct but found there were no outstanding characters in these organs by means of which the species might be distinguished. I figure the hypopygium of the true *megacephala* from the Philippines (Text-fig. 20). A comparison of this figure with any of those of the other genera figured herein will at once show characteristic differences.

CHRYSOMYIA MICROPOGON Bigot.
Bull. Soc. Zoo. France, 1887, xii, p. 601.

I have but one pair of this species before me, which form the basis for the distinguishing characters given in the key and the notes in above paragraph. The hypopygium of the male specimen was badly eaten by some pest so that only the major features were distinguishable but they are identical with those of *megacephala*.

It is not impossible that the variation in size of eye facets in this species from that of typical *megacephala* is not an indication of specific distinction, but this character is quite dependable in related groups so that I do not care to suggest that it is not here. I have already indicated that the hypopygia of the males of closely related species in the genus *Musca* are so similar that they cannot be depended upon to identify readily the species involved, and it is quite within the bounds of possibility that the same applies here.

Localities: Marwood, near Mackay, Queensland, Jan., 1924 (W. C. Harvey), and Glenreagh, N.S.W., 2 Febr., 1923.

Careful field work may develop whether or not there are two species in this complex, but laboratory findings are not satisfactory in such cases.

Subfamily Rhiniinae.

The members of this subfamily have setulae or hairs on the basal section of stem vein on its upper side, and the sternopleurals invariably two in number (1 + 1). The lower calypter is usually much narrower than in Chrysomyiinae, rounded at apex, and without hairs on its upper surface, characters which distinguish the species from those of Chrysomyiinae.

The group is, if we except *Pollenia* and its nearest allies from it, exclusively Old World in its distribution, and its centre of dispersal appears to be Africa and the Orient, a few species overlapping into Australia and Europe. I have recently published a key for the recognition of the genera known to me, and include below one which includes those genera I have seen from Australia.

In this subfamily, as in the others, there are several species described by Macquart which are difficult to identify with certainty. I have attempted to make out these species in my material, but with what success remains to be determined by an examination of the types, if such are in existence.

Very little is known of the immature stages of the members of the group.

Key to Australian Genera.

1. No outstanding stigmatal bristle present, the stigmatal hairs white or yellow; arista with rather long hairs on upper side, bare below 2
   One or two outstanding black stigmatal bristles present which are readily distinguished from the pale stigmatal hairs; arista with very short hairs both above and below ..... *Metallea* van der Wulp
2. First posterior cell of wing closed at apex, the apical fused part of veins 3 and 4 quite conspicuous ..... *Chlororhinia* Townsend
   First posterior cell open, or closed only in margin of wing 3
3. Hind margin of mesopleura with but two bristles, at upper corner ..... *Rhinia* Robineau-Desvoidy
   Hind margin of mesopleura with a complete series of bristles ..... *Stomatorhinia* Rondani

Genus Metallea van der Wulp (1880).

This genus has the centre of propleura haired, and the arista with very short pubescence. The inner margins of the processes of fifth abdominal sternite in males of the Australian species are furnished with closely placed short stubby black bristles (Text-fig. 21), which are not so evident in the Oriental species referred here, and the genital segment of the females has distinct spines as in some other genera of the group.

Rhyncomyia differs from this genus in having the centre of propleura bare, but in other respects is similar; the genus does not occur in Australia so far as I am aware; the species referred here by Macquart possibly belong to *Metallea*. I am of the opinion that the species described by Aldrich as *illingworthi* is *gracilipalpis* Macquart, but an examination of the type of the latter is essential to determine if this supposition is correct. What the other species described as *Rhyncomyia dubia* Macquart may be I do not hazard a guess.

In the following key I have used mostly colour characters, which though not of outstanding significance as a rule, appear here to be reliable. My material is not sufficient to permit of an extensive examination of the genitalia of the males, the most dependable method for identification of the species.

Key to Species.

1. Frons of male at narrowest point about one-seventh of the head width; large species, about 10 mm. in length, with a dark mark on cheek in front of the raised part; parafacials with black setulose hairs; cheeks entirely yellow haired; fourth visible abdominal tergite with two series of long bristles on disc ..... *robusta* Aldrich
   Frons of male reduced to a mere line, at narrowest point not one-twelfth of the head width 2
2. Males 3
   Females 6
3. Entire parafacials and cheeks with fine yellow hairs, those on the former almost imperceptible unless under a strong lens, the ground colour of face, parafacials, and cheeks yellow; abdomen testaceous yellow, with a dark dorsocentral vitta or series of spots, and dark spots on lateral curved portions of tergites, sometimes with these markings much reduced, and at other times with them much diffused and widened ..... *illingworthi* Aldrich

Either the parafacials or cheeks, or both, partly or entirely black haired 4

4. No black hairs on cheeks except directly below parafacials; abdomen testaceous yellow, with a black dorsocentral vitta, a black transverse band close to apex of third tergite, most of fourth black, and a black postspiracular spot on tergites 2 and 3, the incurved lateral portions of basal three tergites yellow .... *insularis*, n. sp.

Most or all of the hairs on cheeks black or fuscous 5

5. Cheeks and parafacials entirely yellow; two or three of the abdominal tergites quite extensively and conspicuously testaceous on lateral anterior portions of disc ..... *nigribarba* Aldrich

Cheek with a mark at middle, and the upper posterior part, fuscous, the parafacials slightly darkened along eye on lower half ..... *puncticeps*, n. sp.

6. Parafacials and cheeks yellow haired, sometimes with a few of the parafacial hairs dark; femora largely yellow ..... *illingworthi* Aldrich

Parafacials with the hairs all black; femora fuscous 7

7. Small species, not over 8 mm. in length; parafacial hairs fine .. *nigribarba* Aldrich?

Larger species, over 9 mm. in length; parafacial hairs strong .... *insularis*, n. sp.

Metallea robusta Aldrich.

Proc. U.S. Nat. Mus., 1926, lxix, art. 22, p. 9.

I have seen only the two specimens of this species from which the species was originally described. The abdominal bristles are stronger than in any other species and the frons of male is broader, as indicated in the above key.

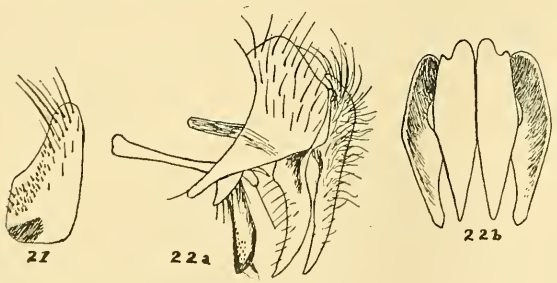
Western Australia.

Type in United States National Museum.

Metallea illingworthi Aldrich. (Text-figures 21 and 22.)

Proc. U.S. Nat. Mus., 1926, lxix, art. 22, p. 7; ? *gracilipalpis* Macq., *Mém. Soc. Sci. Lille*, 1854, p. 129, (1855); *Dipt. Exot.*, Suppl. 5, p. 109, Pl. vi, fig. 3, 1855.

This is evidently a common species in eastern Australia as I have a long series from New South Wales, Queensland, and South Australia. I am almost certain that this is *gracilipalpis* Macquart, but having received a name which we are positive of in its application I use it pending an examination of the type specimen of Macquart's species if it is still available. Hypopygium as in Text-fig. 22. Bezzi's *M. divisa* is probably the same.



Text-figure 21. One process of fifth sternite of *Metallea illingworthi*.
Text-figure 22. Hypopygium of *Metallea illingworthi*. a, side view; b, forceps from behind.

Metallea insularis, n. sp.

Male and female.—Head testaceous; occiput black, and with grey dusting except below level of eyes; frontal orbits in male fuscous almost to bases of antennae, and parafacials slightly darkened along eyes, the dark parts of both

grey dusted, cheek in same sex with a very faint dark central mark; orbits, parafacials, and cheeks in female less noticebaly darkened than in male; antennae brownish yellow; palpi yellow. Thorax metallic blackish green, with bronzy or coppery reflections, and slight whitish dusting, the hairs and bristles on dorsum inserted in dark dots, the dorsal vittae faint. Abdomen of male as described in key, hypopygium black, with greenish tinge, entire surface with slight whitish dusting; female with the abdomen more extensively blackened apically, the hairs and bristles on dark parts in both sexes inserted in dark dots. Legs black, femora with greenish tinge on parts, tibiae and bases of at least the fore and mid tarsi reddish yellow. Wings greyish hyaline, yellowish at bases. Calyptrae and halteres yellow.

Male.—Frons linear above, inner orbital series of bristles strong, outer parts of orbits with black setulose hairs, similar hairs continued on parafacials to, or almost to, level of vibrissae, the hairs on cheeks carried almost to vibrissae, black anteriorly, yellow on raised part; numerous black setulae above vibrissae; arista pubescent. Thorax with four bristles on presutural area, the usual weak anterior sublateral bristle absent; dorsocentral bristles 2 + 4; one propleural and one stigmatal bristle, both strong. As usual in the Australian species of this genus there is no ventral bristle on the mid tibia in this sex; hind tibia with about six irregular anterodorsal, one anteroventral, one posterior, and three posterodorsal bristles. Wings normal, one setula below and two or three above at base of third vein.

Female.—Frons at vertex about one-fifth, at anterior margin over one-third, of the head width, interfrontalia of uniform width on entire length, orbits much widened anteriorly. Hind tibia with 4-5 anterodorsal, two posterodorsal and two anteroventral bristles.

Length, 9-10 mm.

Type male, and allotype, Milson Island, N.S.W.

Metallea nigribarba Aldrich.

Proc. U.S. Nat. Mus., 1926, lxix, art. 22, p. 10.

A female, which is evidently of this species, is from Eidsvold, Queensland (Bancroft). I have examined the type male of this in the United States National Museum. It is from eastern Australia.

Metallea puncticeps, n. sp.

Male.—A much darker species than any of the others, being without noticeable testaceous markings on the abdomen. The markings on the head are constant in the three males before me and appear to be of specific import. The abdomen is blackish green, with whitish dusting through which the coppery reflections show faintly on the sides of the tergites, the dorsum has a trace of a dark central vitta, and there are dark dots at bases of the hairs and bristles only on the sides of the tergites. In other respects similar to *insularis*.

In nearly every case is there a shorter bristle below the propleural one in the type series of this species, while there is such a bristle on one side only in the type of *insularis* and none on the allotype.

Length, 6-7·25 mm.

Type and two paratype males, Perth, Western Australia (Nicholson).

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Genus Chlororhinia Townsend (1917).

This genus is common in the Orient. The only species occurring in Australia is readily distinguished from any other of the subfamily by its brilliant metallic blue colour, besides the characters cited in the foregoing key.

Chlororhinia viridis Townsend.

Rec. Ind. Mus., 1917, xiii, p. 191.

The dorsum of the abdomen is largely opaque black in most specimens of the species.

Localities: Illawarra and Sydney, N.S.W.; Kuranda and Cairns, Queensland.

Genus Rhinia Robineau-Desvoidy (1830).

This genus is very similar to *Stomatorhinia* in all particulars, but besides the presence of only two bristles on the upper hind angle of mesopleura, which is rarely departed from, instead of a complete series on its entire length, the males have invariably a series of long bristles on the hind margin of the first visible tergite, usually divided more or less at middle, which are not developed in the other genera of the subfamily, and the hind tibia has a series of regular short anterodorsal setulae with one or two slightly longer. In the species before me there is a large glossy black undusted area covering the lower anterior angle of mesopleura and the anterior portion of sternopleura in *Rhinia*, while in *Stomatorhinia* the entire pleura is densely grey dusted. The presence of this glossy area readily distinguishes the species listed below from those of the species of *Stomatorhinia* occurring in Australia, but it may not hold throughout the genus in other faunal regions.

Rhinia quadrinotata Bigot.

Ann. Soc. Ent. France, 1874, p. 238.

I identify as this species several specimens amongst my Australian material. These have been carefully compared with specimens from the Philippine Islands and appear to agree perfectly with them, there being no structural or other differences.

Localities: Cairns, N. Queensland (Dodd); Sydney, N.S.W.

Genus Stomatorhinia Rondani.

This genus is most closely related to *Rhinia*, but is distinguished as stated in the key and under the preceding genus.

The species of the genus are difficult to separate satisfactorily and even the two Australian species require further elucidation, though the two forms accepted in this paper are undoubtedly distinct, the species listed as *subapicalis* being very similar to one or two others occurring in the Orient.

I present a synopsis of the species below.

A. Testaceous yellow species, with yellow palpi, orbits and lower half of face castaneous, thorax largely fuscous, obscured by dense whitish grey dusting, scutellum testaceous, with a conspicuous black spot at base of each of the four marginal bristles; no well developed posteroventral bristles on basal half of hind femur of female; wing without an evident preapical dark costal mark; black spots of frontal orbits biseriate ..... *pallida*, n. sp.

AA. Greenish black species, with black or dark brown palpi, anterior half of cheeks as well as lower half of face glossy black or castaneous, the scutellum at most testaceous on margin, and with inconspicuous dark dots at bases of the four marginal bristles; abdomen with lateral testaceous marks on basal two or three tergites; hind femur with one or two long bristles on basal half of posteroventral surface; black setigerous spots on frontal orbits triseriate anteriorly ..... *subapicalis* Macquart

STOMATORHINIA PALLIDA, n. sp.

Female.—Head testaceous yellow; orbits castaneous, densely whitish dusted, with two series of glossy black piliferous spots; face glossy, with a broad central band of whitish dust, the lower undusted half castaneous; parafacial white dusted, with a few piliferous glossy spots and, near lower extremity, a large glossy mark; cheeks densely white dusted, anterior half with an oblique glossy area; antennae testaceous, third segment more or less browned; palpi testaceous. Thorax largely fuscous, densely whitish grey dusted, the entire pleura covered with white dust, and, like the dorsum, with many dark piliferous spots; scutellum testaceous, dusted and dotted like the mesonotum, and with a conspicuous black spot at base of each of the four marginal bristles. Abdomen testaceous, with dark apices to the tergites, dusted and dotted like thorax, the dots at apices of tergites most evident. Legs testaceous, apices of tarsi darkened. Wings hyaline. Calyptrae white. Halteres yellow.

Structurally similar to the other species of the genus, but in the two females I have seen there are no noticeable bristles at base of the posteroventral surface of hind femur.

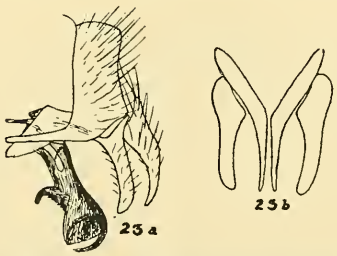
Length, 6 mm.

Type, Cairns, N. Queensland. One paratype, same locality (J. F. Illingworth) [U.S.N.M.].

STOMATORHINIA SUBAPICALIS (Macquart). (Text-figure 23.)

Mém. Soc. Sci. Lille, 1846, p. 98 (1847); *Dipt. Exot.*, suppl. 2, p. 82, pl. v, fig. 4, 1847; *australis* Walker, *Cat. Dipt. Brit. Mus.* iv, p. 809, 1849; *murina* Schiner, *Reise Novara*, Dipt., p. 309, 1868.

This species resembles *lunata* Fabricius, but the dorsum of thorax has many black piliferous dots and no evident vittae, the pleura are more densely grey



Text-figure 23. Hypopygium of *Stomatorhinia subapicalis*; a, side view; b, forceps from behind.

dusted and more conspicuously black dotted, the wing has a more or less evident dark preapical costal cloud, and the mid femur has a series of short stout spines at apex on posteroventral surface which is not present in the African male before me. Hypopygium as Text-fig. 23.

Length, 6-8 mm.

Localities: Eidsvold, Queensland; Sydney and Botany Bay, N.S.W.; Beaconsfield, Victoria and Myponga, S. Australia.

STOMATORHINIA CRIBELLATA Bezzi.

Stomorhina cribellata Bezzi, *Bull. Ent. Res.*, 1927, xvii, p. 233.

I have not seen this species, unless it may be the species I accept as *subapicalis*. It is not *pallida*.

STOMATORHINIA DISCOLOR Fabr.

Ent. Syst., iv, p. 320, 1794. (Doubtful record.)

STOMATORHINIA XANTHOGASTER Wied.

Aussereurop. Zweifl. Ins. ii, p. 349, 1830. (Doubtful.)

Subfamily Sarcophaginae.

The members of this subfamily occurring in Australia have been competently handled by other workers so that it is unnecessary for me to do more than mention some unconsidered characters here.

In no work dealing with the genus *Sarcophaga* has there been any mention made of such characters as the hairs on prosternum, centre of propleura, and centre of the declivous portion of thorax above calyptrae. I find that by the use of these characters, which are present or absent in certain groups, it is possible to associate more readily the sexes than it is by any other means, and believe that the adoption of their use in classification would simplify the identification of the species, at least in so far as the females are concerned.

I have on a previous page dealt with the structure of the hypopygial forceps as an indication of group location. It is also possible to use the structure of the genital segments of the females as specific indices, but very little has been done in this respect by any worker in this genus. There are some very characteristic features of these segments in some of the species, possibly arising from adaptations to some peculiarity in oviposition, but whether they lend themselves to grouping of the species as well as to identification of individual species I have not determined as yet.

Subfamily Metopiinae.

This subfamily has most frequently been placed in the Tachinidae, but it undoubtedly has closer affinities with Sarcophaginae than with any subfamily of Tachinidae.

The second abdominal sternite is fully exposed and overlies the lateral margins of the second tergite as in other subfamilies of Calliphoridae, but the arista is always bare or pubescent, the lower calypter is always bare on upper disc and in most, if not all, genera bulged up near base, with an inflated appearance; the sternopleurals are frequently 1 + 2 or 3; and the notopleurals are two in number. The small knob-like protuberance before base of wing on upper part of pleura is well developed and stands out from the side more than does the upper margin of the pleura, as in Calliphoridae, while in Tachinidae it is as a rule less developed and about level with the upper edge of pleura.

The species so far as known occur in the immature stages in nests of solitary bees, but the life-histories are but little known, and whether they are parasites or scavengers is not definitely known.

There appear to be two genera in my Australian material, both of them already known to science. They may be distinguished as below.

A. Vibrissae not differentiated, the bristles of uniform length from some distance below vibrissal angle to well above it ..... *Miltogramma* Meigen

AA. Vibrissae well developed and quite distinct from the setulae above and below them ..... *Protomiltogramma* Townsend

Genus Miltogramma Meigen.

I appear to have two species of this genus, but represented by single specimens.

Genus Protomiltogramma Townsend.

I have seen the genotype of this species in the United States National Museum, and have several specimens which are either the same or a closely allied species. Pending receipt of more material I leave these genera in abeyance. The genotype is *cincta* Townsend, described from Queensland.

Unrecognized Species.

Calliphora elliptica Macq. *Mem. Soc. Sci. Lille*, 1846, p. 99 (1847); *Dipt. Exot.*, suppl. 2, p. 83, pl. v, fig. 6, 1847.

Pollenia ruficornis Macq. *Mem. Soc. Sci. Lille*, 1846, p. 101 (1847); *Dipt. Exot.*, suppl. 2, p. 85, pl. v, fig. 8, 1847.

Pollenia viridiventris Macq. *Mem. Soc. Sci. Lille*, 1846, p. 100 (1847); *Dipt. Exot.*, suppl. 2, p. 84, pl. v, fig. 9, 1847.

Pollenia tasmanensis Macq. *Mem. Soc. Sci. Lille*, 1850, p. 227 (1851); *Dipt. Exot.*, suppl. 4, p. 254.

Pollenia ruficornis Macq. *Mem. Soc. Sci. Lille*, 1850, p. 227 (1851); *Dipt. Exot.*, suppl. 4, p. 254.

Pollenia moretonensis Macq. *Mem. Soc. Sci. Lille*, 1854, p. 136 (1855); *Dipt. Exot.*, suppl. 5, p. 116, 1855.

Anastellorhina bicolor Bigot. *Bull. Ent. Soc. France*, 1885, p. xxvi.

Rhyncomyia incisuralis Macq. *Mem. Soc. Sci. Lille*, 1850, p. 214 (1851); *Dipt. Exot.*, suppl. 4, p. 241, pl. xxii, fig. 8.

Rhyncomyia dubia Macq. *Mem. Soc. Sci. Lille*, 1854, p. 129 (1855); *Dipt. Exot.*, suppl. 5, p. 109, pl. vi, fig. 4, 1855.

Rhyncomyia tigrina Bigot. *Ann. Soc. Ent. France*, 1874, Ser. 5, iv, p. 242.

Principal recent papers on Australian Calliphoridae as limited in catalogue.

Aldrich, J. M.—*Proc. U.S. Nat. Mus.*, 1925, lxiv, art. 18. Deals with *Microcalliphora*.
Id., Proc. U.S. Nat. Mus., 1926, lxix, art. 22. Deals with *Metallea*.

Bezzi, M.—*Bull. Ent. Res.*, 1927, xvii, pt. 3. Keys to species of South Pacific Islands and Australia, with a few descriptions of new Australian species.

Hardy, G. H.—*Proc. Roy. Soc. Qld.*, 1925, xxxvii (1926). Deals with the Australian species of *Calliphora*.

Johnston, T. H., and Hardy, G. H.—*Proc. Roy. Soc. Qld.*, 1922, xxxiv, No. 3. Biology.
Id., 1922, No. 10. Synonymic list of species.

Malloch, J. R.—*Ann. Mag. Nat. Hist.*, 1926, (9), xvii, p. 507.

Patton, W. S.—*Phil. Jour. Sci.*, 1925, xxvii, No. 3. Deals with *Calliphora, Lucilia* and *Chrysomyia sens. lat.*